ON-SITE RECONNAISSANCE INSPECTION

of

HOUSTON GAS LIGHT COMPANY

(TXD981918188)

Prepared By

Michael N. Mitchell, FIT Geologist

Ecology and Environment, Inc.
Region VI

August 29, 1991

ecology and environment, inc.
1509 MAIN STREET, DALLAS, TEXAS 75201, TEL. 214-742-6601
International Specialists in the Environment

PREFACE

This On-Site Reconnaissance Inspection Report was prepared by Ecology and Environment, Inc. for the Environmental Protection Agency under Contract Number 68-01-7347.

ON-SITE RECONNAISSANCE INSPECTION

of

HOUSTON GAS LIGHT COMPANY

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FIGURES

1. INTRODUCTION

The Ecology and Environment, Inc. (E & E) Region VI Field Investigation Team (FIT) was tasked by the U. S. Environmental Protection Agency (EPA) under Technical Directive Document (TDD) F06-9004-03 to conduct a Listing Site Inspection (LSI) of the Houston Gas Light Company (TXD981918188) site in Houston, Harris County, Texas. The EPA subsequently modified the task to require an On-Site Reconnaissance Inspection Report in lieu of the LSI Report.

1.1 LISTING SITE INSPECTION OBJECTIVES

The LSI is the final investigative stage of the pre-remedial process. Only those sites requiring further action after the Screening Site Inspection (SSI) are LSI candidates.

The LSI characterizes the site through Hazardous Ranking System (HRS) documentation. It expands upon information obtained during the SSI and Preliminary Assessment (PA), including SSI and PA reports, HRS PreScores, reconnaissance inspections and analytical data.

1.2 SITE DESCRIPTION

The Houston Gas Light Company (HGL) site is located at 1515 Commerce Street, adjacent to Buffalo Bayou at the north edge of the central business district of Houston, Texas (Figure 1) (Ref. 4, p. 1, Attachment 2, p. 1). The geographic coordinates of the site are 29°45'39" north latitude and 95°21'15" west longitude (Ref. 4, p. 3). The site is an approximately four acre parcel of land which was the former location of a town gas manufacturing plant, operated from the late 1800s to the early 1900s. The site is bounded by Commerce Street on the south and Buffalo Bayou on the north. The Elysian Street Viaduct ramps connect with LaBranch Street to the west and Crawford Street to the east (Ref. 4, p. 11, Attachment 1, Attachment 2, p. 9). The southeast corner of the site is currently utilized by ENTEX, the successor company to HGL, as a natural gas metering and distribution facility (Ref. 12). The remaining portion of the land between the Elysian Street Viaduct ramps is covered by a Harris County warehouse and parking lot (Figure 2) (Photographs).

ENTEX (a division of Arkla, Inc.) headquarters are located at 1600 Smith Street, P. O. Box 2628, Houston, Texas 77252-2628 (713/654-5555). Permission to conduct the on-site reconnaissance inspection was granted by Senior Vice President William L. Clayton (Ref. 13).

HGL was organized in 1866 and entered an agreement with the City of Houston in 1868 to light 75 street lamps. HGL was reorganized as the Houston Gas Company in 1905 and was succeeded by the Houston Gas and Fuel Company in 1911 (Ref. 2). The capacity of the gas manufacturing plant was 1,500,000 cubic feet in 1905 (Ref. 1). In 1917, an average of one car of coke per day was used to manufacture gas (Ref. 3). Natural gas was introduced into the city mains in May 1926. Houston Gas and Fuel Company merged with United Gas in 1937. United Gas, Inc. voted to change its name to ENTEX on March 28, 1974 (Ref. 2).

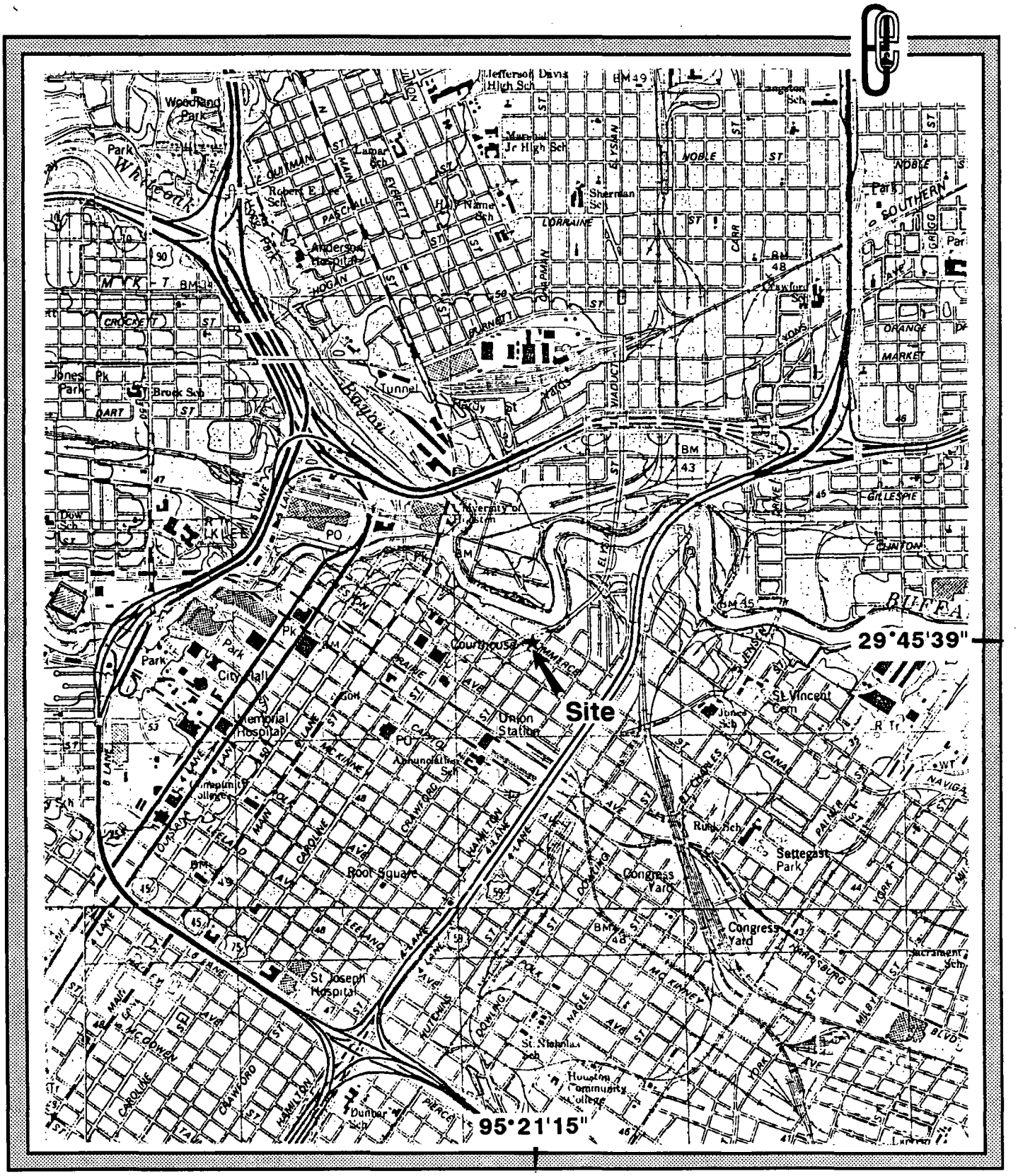


FIGURE 1

SITE LOCATION MAP

HOUSTON GAS LIGHT COMPANY

HOUSTON, TEXAS

TXD981918188

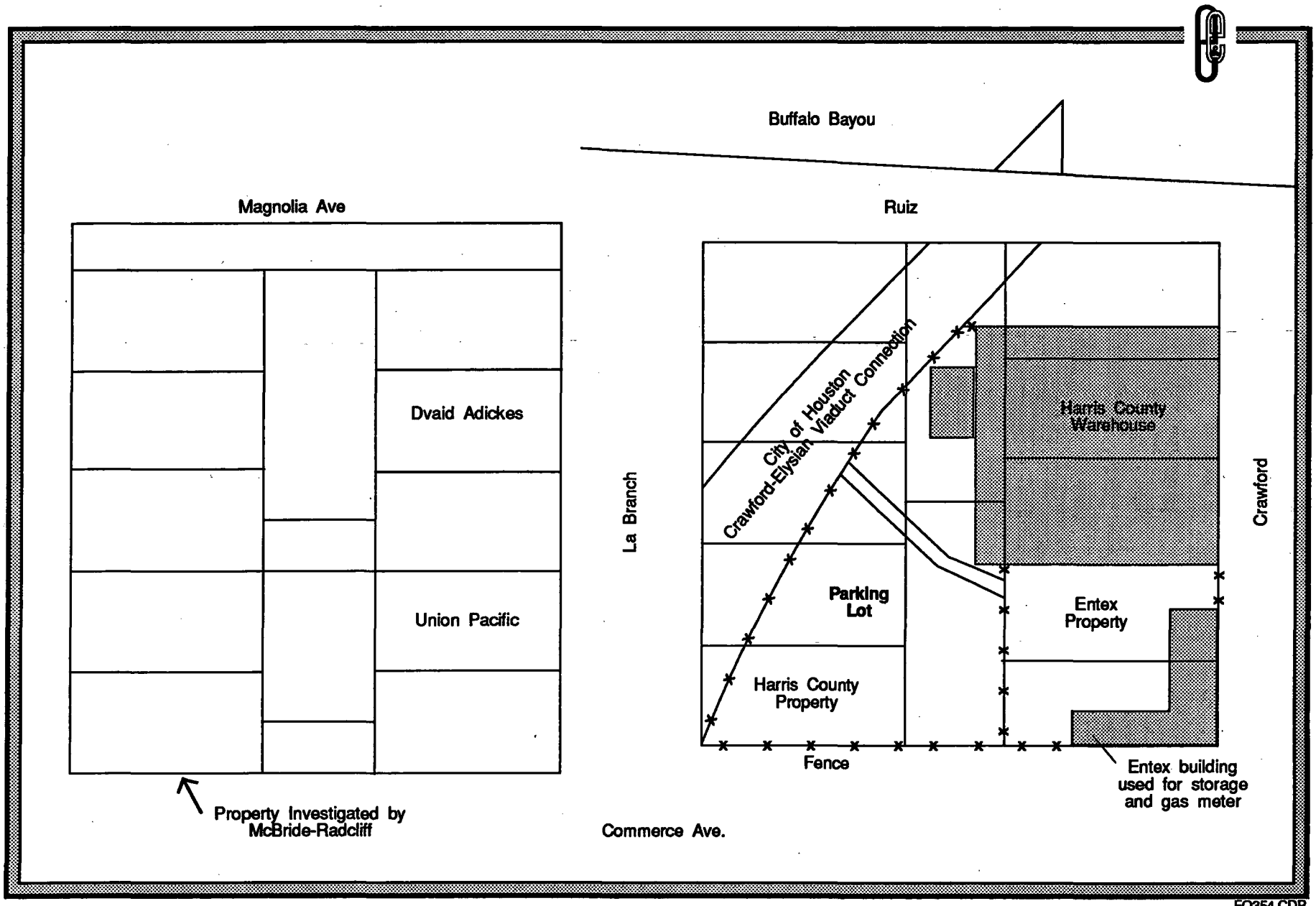


FIGURE 2
SITE SKETCH
HOUSTON GAS LIGHT COMPANY
HOUSTON, TEXAS
TXD981918188

Facilities similar to HGL manufactured gas from coke at the site for illumination, cooking and heating. These plants produced a variety of wastes, some of which may have been disposed of on-site (Ref. 4, p. 11). No information on HGL waste handling and disposal practices has been found. A PA of the site was conducted by the Texas Water Commission (TWC) on December 5, 1986. A site inspection (SI) was not planned at that time because the entire property was covered by buildings or pavement. On April 6, 1988, McBride-Ratcliff and Associates, Inc. contacted the TWC regarding the HGL site (Ref. 4, p. 11). McBride-Ratcliff had just completed an investigation of an adjoining property in which it had detected polynuclear aromatics in samples collected from site investigation borings. The polynuclear aromatics reported by McBride-Ratcliff are commonly found in coal tar wastes from town gas manufacturing plants (Ref. 4, Attachment 2, pp. 13-14).

2. DATA REVIEW AND DATA COLLECTION

A TWC PA of the site was finalized on December 5, 1986, and a TWC SI, based on information obtained during the McBride-Ratcliff investigation of the adjoining (west) property, was completed on September 14, 1988 (Ref. 4, p. 1).

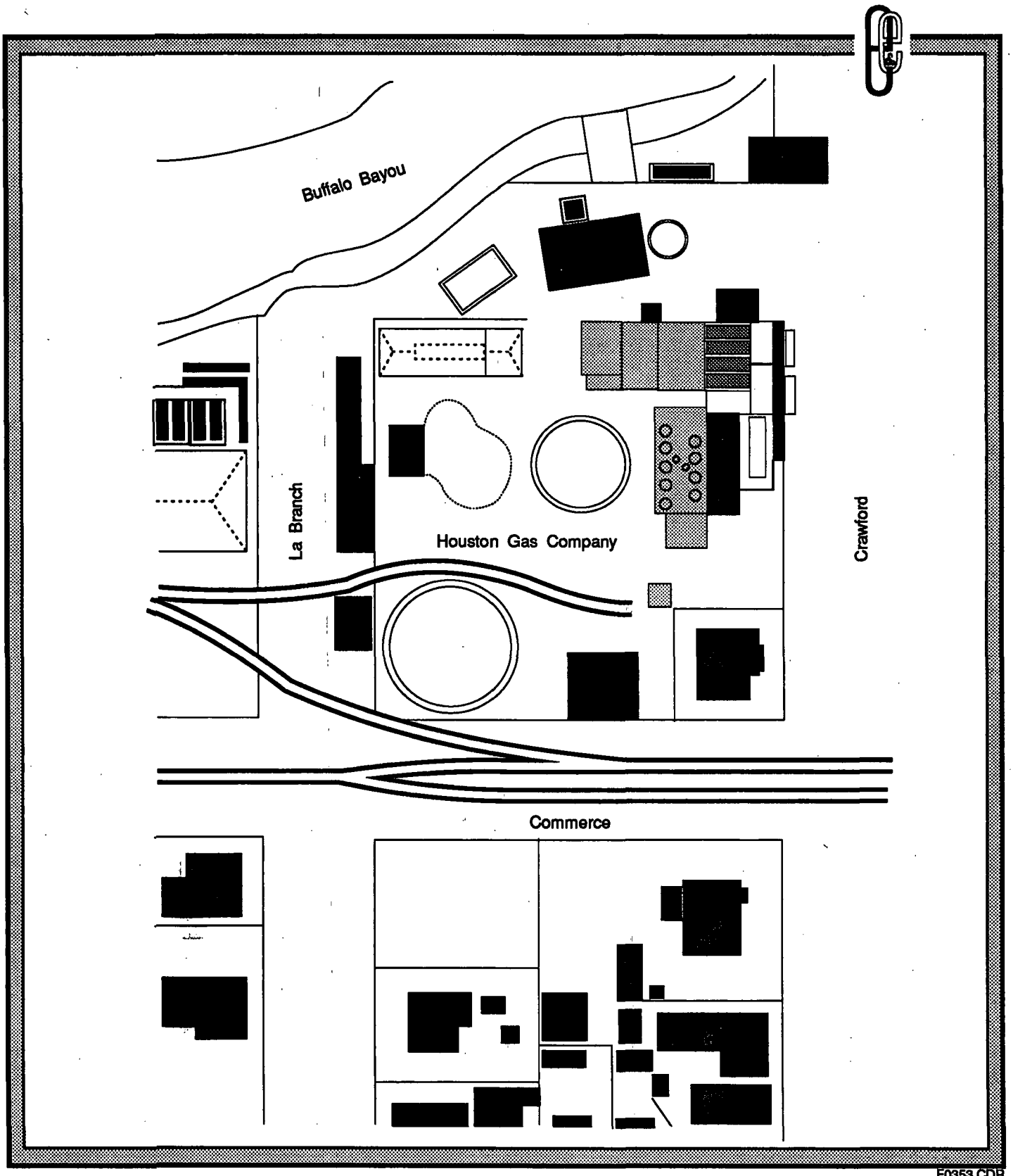
On December 5, 1990, the FIT conducted an on-site reconnaissance inspection to collect background data and to identify potential waste sources and targets. The FIT was comprised of Michael N. Mitchell and Greg Straughn. The ENTEX representative present during the inspection was Lanny W. Cargile, P.E., Operations Engineer. Photographs taken during the on-site reconnaissance inspection are included in Attachment A.

3. PATHWAY CHARACTERISTICS

The following sections characterize waste sources and migration pathways.

3.1 SOURCE WASTE

No historical information has been found regarding waste handling or disposal practices of HGL coal gasification operations at the site. A copy of the circa 1900 Sanborn fire insurance map included with the TWC SI shows the relative position of structures at the site and adjacent facilities (Figure 3). An underground oil storage tank and a surface coal pile are shown on the map, but waste handling areas are not indicated (Ref. 4, Attachment 1). The majority of the site is occupied by gas manufacturing structures, which would have left very little space for waste to be accumulated or disposed of on-site. The McBride-Ratcliff investigation of the adjoining (west) property revealed polynuclear aromatic hydrocarbons approximately 11 feet below ground level in several of the borings (Ref. 4, Attachment 2, pp. 8, 13). Semivolatile organics extended 30 to 42 feet deep in Boring CB-5 Naphthalene was reported at 4,235 ppm from a sample collected from Boring CB-4 (Ref. 4, Attachment 2, pp. 8, 13). The exact location and amount of waste at the site are unknown. No known waste is exposed at



N

Not to Scale

FIGURE 3
SANBORN FIRE INSURANCE MAP (CIRCA 1900)
HOUSTON GAS LIGHT COMPANY
HOUSTON, TEXAS
TXD981918188

the surface and the majority of the site is covered by buildings or paved parking lots.

3.2 GROUND WATER

The HGL site is located on fill materials overlying surficial deposits of the Beaumont Formation, which is one of the units which comprise the Chicot aquifer (Ref. 4, Attachment 2, p. 11; Ref. 5; Ref. 6, p. 10). The water table was encountered from 28 to 34 feet below land surface in several on-site boreholes (Ref. 4, Attachment 2, p. 12). Underlying the Chicot aquifer is the Evangeline aquifer, which is the principal source of ground water in the Houston area (Ref. 6, p. 10). Approximately 50 percent of the City of Houston's water is produced from water wells (Ref. 7). Water production from the Evangeline aquifer in the vicinity of the site ranges from depths of 700 to 2,000 feet. The City of Houston has nine production wells within a four mile radius of the site (Ref. 14). The nearest well is located 1.4 miles west of the site (Ref. 8).

Analytical data shows organic contaminants extending from the unsaturated zone beneath the site to below the water table. Contaminants in the ground water include acenaphthene (31 ppm), acenaphthylene (28 ppm), anthracene (24 ppm), benzo(a)anthracene, chrysene (7ppm), fluoranthene (30 ppm), fluorene (60 ppm), naphthalene (435 ppm) phenanthrene (123 ppm) and pyrene (144 ppm) (Ref. 4, Attachment 2, pp. 7, 8, 12, 13).

3.3 SURFACE WATER

The northern boundary of the HGL site is formed by the bank of Buffalo Bayou. The north edge of the site is located within a 500 year flood zone (Ref. 9). Buffalo Bayou downstream from the site is tidal and the only designated uses are navigational and industrial/cooling water supply (Ref. 10, p. 51). There are no drinking water intakes located within the 15 mile downstream segment (Ref. 10, p. 51). There are no known fishery, or sensitive environment, target populations near the site. The two year, 24 hour rainfall for the area is 5 inches (Ref. 11).

3.4 SOIL EXPOSURE

The majority of the site is currently covered by buildings or parking lots. The southeast corner of the site is utilized by ENTEX as a natural gas metering and distribution facility. The north and west portions are covered by a Harris County warehouse and asphalt paved parking lot. The McBride-Ratcliff report of the adjoining (west) property indicated that an average of 19 feet of fill material were present and ranged from nine to 33 feet thick. Black asphaltic materials were reportedly found in four soil borings at approximately 11 to 13 foot depths. The asphaltic material was overlain by relatively clean construction debris and fill soils (Ref. 4, Attachment 2, p. 15). No hazardous waste appears to be exposed at the surface.

3.5 AIR

Due to the depth of burial of site waste (11 to 13 feet), and the current use of the property (covered by streets, parking lots or buildings), the air pathway is not a route of concern.

4. CONCLUSIONS

HGL operated a town gas manufacturing plant at the site from approximately 1866 to 1926. As part of its operations, HGL may have disposed of coal tar wastes at the site. Analysis of samples from soil borings drilled during the investigation of the adjoining (west) property indicated that polynuclear hydrocarbons were present in four borings at the west edge of the site, at depths from approximately 12 feet to below the water table. The northern boundary of the site is the bank of Buffalo Bayou. In the vicinity of the site, the water from Buffalo Bayou is used only for navigation and industrial cooling water. The nearest drinking water supply well is located 1.4 miles west of the site, and produces from the Evangeline aquifer between depths of 747 to 1,990 feet.

REFERENCES

1 Article. Houston Gas Company. Houston Chronicle Souvenir Anniversary Edition. Houston, Texas. October 1905.

2 Memorandum. Historical Information, Houston Gas Light Company. From: Michael N. Mitchell, FIT Geologist. To: File. January 31, 1991.

3 Article. Houston Gas and Fuel Division of United Gas Corporation. Houston Chronicle. December 12, 1939.

4 Site Inspection Report of Houston Gas Light Company. Texas Water Commission. September, 14, 1988.

5 Geologic Atlas of Texas, Houston Sheet, Scale 1:250,000. Bureau of Economic Geology, The University of Texas at Austin, Austin, Texas. February 1968.

6 Jorgensen, Donald G. U.S. Geological Survey. Analog-Model Studies of Ground-Water Hydrology in the Houston District, Texas. Report 190. Texas Water Development Board. February, 1975.

7 Record of Communication. Current Ground Water Production-City of Houston. From: Michael N. Mitchell, FIT Geologist, Ecology and Environment, Inc. To: Jim Bell, Production Technician, Ground Water Section, Public Works Department, City of Houston. January 17, 1991. TXD981918188.

8 Record of Communication. Water Wells Within a Four Mile Radius of the Houston Gas Light Company Site. From: Michael N. Mitchell, FIT Geologist, Ecology and Environment, Inc. To: Dana L. Barbie, Hydrologist, United States Geological Survey, Water Resources Division, 2320 LaBranch, Houston, Texas. January 31, 1991. TXD981918188.

9 Flood Insurance Rate Map. Harris County, Texas and Incorporated Areas. Panel 285 of 390. Map Number 48201C0285G. Federal Emergency Management Agency. September 28, 1990.

10 Texas Surface Water Quality Standards. Texas Water Commission. April 29, 1988.

11 Herschfield, D.M., Rainfall Frequency Atlas of the United States. U.S. Weather Bureau Technical Paper No. 40. 1961.

12 Memorandum. On-Site Reconnaissance. From: Michael N. Mitchell, FIT Geologist, Ecology and Environment, Inc. To: File. December 5, 1990.

13 Letter. Access to Property at 1515 Commerce. From: William L. Clayton, Senior Vice President, ENTEX, Houston, Texas. To: Ed Sierra, U.S. EPA Region VI, Hazardous Waste Section. Dallas, Texas. November 30, 1990.

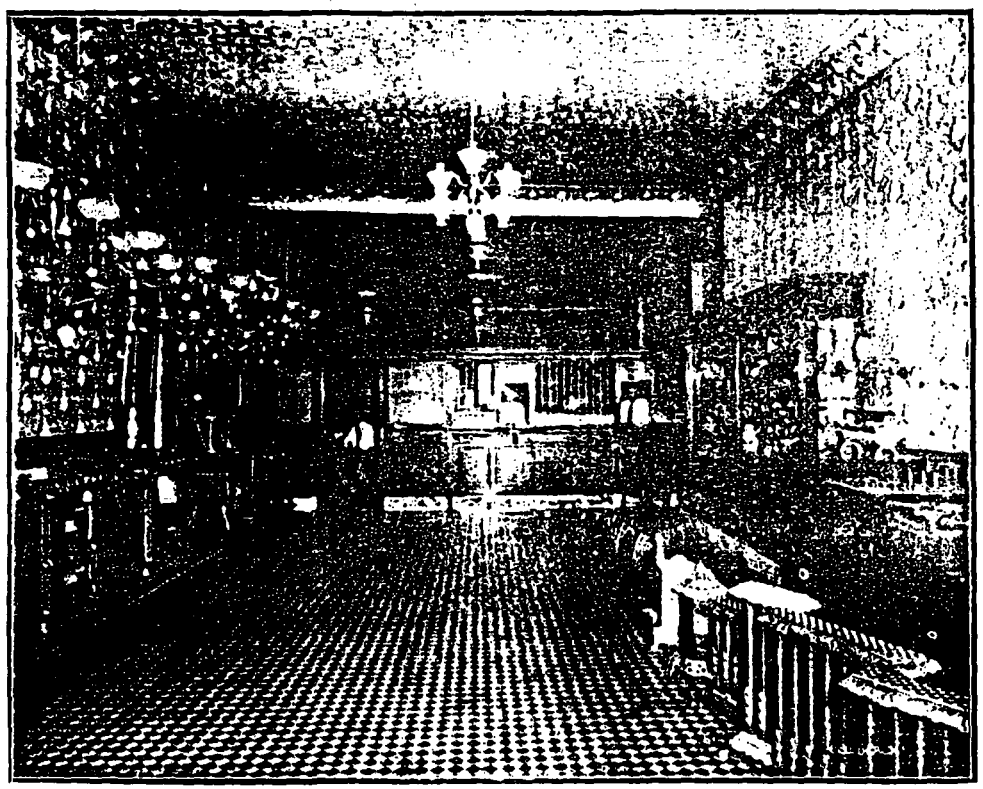
14 U.S.G.S. 7.5 Minute Series Topographic Map. Houston Heights, Texas, 1982. Settegast, Texas, 1982. Bellaire, Texas, 1982. Park Place, Texas, 1982.

HOUSTON GAS COMPANY

There has probably been no invention in the world for the past number of years which has been of more material benefit to mankind in general than the manufacture of artificial gas. It has had the effect of furnishing a clean and effective fuel heretofore unknown to the world and a light which has no superior. The benefit and effectiveness, however, depends largely upon the class of the plant and in this Houston has been particularly fortunate.

The Houston Gas Company was first organized in 1866 when the town was little more than a village, and, properly speaking was not in that class of cities which were enjoying this unusual advantage. A representative number of citizens headed by the lamented T. W. House, Sr., got together on this as they did many other things, and began to give Houston some of the advantages that were enjoyed by the more populous cities of the North. They had a hard struggle of it, but were men who did not know what the word fail meant and as a result today Houston has one of the most efficient gas plants in the South.

Their plant, however, since that time has undergone many changes for the better and only a few years ago was practically entirely rebuilt with a capacity sufficient to meet the wants of a greater Houston. Their present capacity is 1,500,000 cubic feet which is far ahead of the requirements at the present time and will meet the needs of the city for some years to come. Like their first effort, the company foresaw the coming greatness of the city and based their calculations accordingly. They have fifty miles of mains running to every section and supplying the entire city with gas for heating and lighting purposes. Their gas plant is located at the corner of Commerce and Crawford streets and is modern in every particular. It is equipped with all the latest appliances for turning out a pure and highly commercial gas for all purposes. This is furnished the citizens of Houston at a rate under a great many of the leading cities of the South. Their service is excellent in every respect and there is hardly a first-class residence or business house in the city which is not connected with their mains. They also handle a complete line of gas fixtures, including stoves, chandaliers and all the latest appliances for the safe and economical use of gas in any form.



OFFICE OF HOUSTON GAS COMPANY

They have handsome offices and salesrooms at 604 Main street, near the central part of the business district of the city and have on exhibition at this place a complete line of their appliances and fixtures.

The Houston Gas Company is capitalized at $600,000, with the following officers: T. W. House, president; Jas. A. Baker, Jr., vice president; C. H. Dunbar, secretary and general manager.

Mr. Dunbar, the general manager, came from Elgin, Illinois, some five months ago to assume charge of the plant and his energy and experience has already made itself manifest in the excellent service which is being given at the present time. There is not another public utility in Houston which has given more universal satisfaction than the Houston Gas Company and under its present management it will continue to be an industry of which she may well feel proud. Mr. Dunbar has had charge of several of the leading gas plants of the country and he is a master of every detail of the business.

Reference 2

I N T E R O F F I C E M E M O R A N D U M

TO: File

FROM: Michael N. Mitchell, FIT Geologist M.N.M.

DATE: January 31, 1991

SUBJECT: Historical Information
Houston Gas Light Company

On January 31, 1991, the following historical information on the Houston Gas Light Company was obtained from microfilm copies of Houston Chronicle newspaper articles. The articles are part of the collection maintained in the City of Houston Public Library Historical Document Section.

1866	Houston Gas Light Company was organized
1868	Agreement with City of Houston to light 75 street lamps
1905	HGL reorganized as Houston Gas Company
1911	Houston Gas Company succeeded by Houston Gas and Fuel Company
May, 1926	Natural gas through City mains for first time
1937	Houston Gas and Fuel Company merged with United Gas Corporation
March 2, 1974	United Gas, Inc. changed name to ENTEX

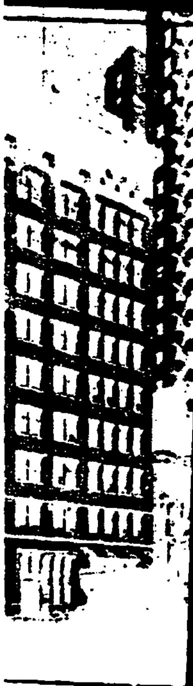
8/4/72

B dg. - Hst.

REFERENCE: 3

7 1939

ng Leased



as been leased for 15
ncern will spend more
nning and moderniza-
ited Gas Building. J.

Serving [illegible] for 73 Years, Concern Has Grown From Small Set-Up to Become a Vast Operator

DEC 12 1939

[illegible] 73 years of [illegible] service in Houston [illegible] by the Houston Gas and Fuel Division of United Gas Corporation, is being celebrated [illegible] week [illegible] the opening of its new building at Texas and San Jacinto.

In passing this prominent milestone, officials of the company paused for a glance backward. Their recollections Tuesday turned back the calendar to 1866, when the Houston Gas Works, as the firm then was known, [illegible] a [illegible] supply of manufactured gas—the first in the South.

Gas [illegible] a newcomer then. It still was in the experimental stage and skeptics clung to kerosene, deriding the newfangled method of illumination. A few gas jets were set up on street corners, and several of Houston's more prosperous citizens lighted their homes with the strange new substance. They paid [illegible] $12 for 1000 feet of the manufactured gas.

At its inception, the company handled a lively coal and coke business which is credited with carrying the burden of the lean experimental years of gas illumination.

Service Extended.

Those were the days when Galveston was the largest city in Texas. Paved streets in Houston were scarce, and the mule-drawn wagons of the gas company struggled through lanes of deep dust and mud as they extended the service farther from the heart of town. By 1900 Houston had a population of 44,000 and the gas company had laid 27 miles of mains.

When the cost of gas began to decrease, Houston housewives started discarding wood and coal-burning stoves in favor of the luxurious gas ranges. First of the ranges was installed in the home of Colonel Baer at 1602 Rusk Avenue, according to company records.

Just after the turn of the century, Houston Gas and Fuel became pressed for sufficient gas to meet the growing demand. With the winters came appeals from the company asking that customers use gas sparingly for heating. As late as the winter of 1917-18 the plant was being taxed to capacity. The normal consumption of coke in the manufacture of gas was one car a day. The company was burning three cars daily and additional coke was hard to find.

Natural Gas Comes.

The inauguration in 1926 of natural gas service solved the shortage problem. Four years later, Houston Gas and Fuel merged with the United Gas Corporation and thereby obtained a practically unlimited supply of natural gas.

Oldest living employe of the company is J. J. Fry of 822 East Twenty-Ninth Avenue. Mr. Fry's first pay check from a gas company was drawn in Birmingham, England in 1876. He went to work for the Houston Gas Light Company in 1887.

Although Mr. Fry retired from active service several years ago, his son, John Ernest Fry, is carrying on the tradition of the family as an employe in the company's distribution plant.

From a cost of $12 per 1000 cubic feet to 65 cents—from a straggling 25 miles of gas mains to a tightly woven network of more than 800 miles of mains—from a small, squat gas works to an imposing skyscraper—these are material milestones in the Houston Gas and Fuel parade of progress.

RETURN TO CHRONICLE MORGUE

BUSINESS ROUNDUP

Gas Building Le

A New York investor has bought the lease control of the United Gas Bldg. at the southwest corner of San Jacinto and Texas for approximately $1 million.

The Bobrow Management Corp. of New York, headed by Aaron Bobrow, made the purchase from the Phoenix Corp. of Houston, a Jesse H. Jones interest.

Bobrow, who purchased the 10-story building as an investment, is expected to complete the purchase within three months.

Representing the sellers of the leasehold was J. H. Creekmore, attorney for the Jones Interests.

Built in 1923-24 as the Keystone Bldg. and later called the First Marine Bank & Trust Co. Bldg., it has been occupied by the United Gas Corp. since 1939.

Owner of the property on which the building sits is [illegible] D. Namen, a longtime Houston resident.

The leasehold has another 60 years to run on a 99-year lease.

The sale was negotiated by Paul E. Wise Co., Inc., of Houston.

REFERENCE: 4

EPA

NTIAL HAZARDOUS WASTE SITE
ITE INSPECTION REPORT

REGION	SITE NUMBER (to be assigned by HQ)
6	TXD 981918188

GENERAL INSTRUCTIONS: Complete Sections I and III through XV of this form as completely as possible. Then use the information on this form to develop a Tentative Disposition (Section II). File this form in its entirety in the regional Hazardous Waste Log File. Be sure to include all appropriate Supplemental Reports in the file. Submit a copy of the forms to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME	B. STREET (or other identifier)		
Houston Gas Light Co.	1515 Commerce		
C. CITY	**D. STATE**	**E. ZIP CODE**	**F. COUNTY NAME**
Houston	TX	77002	Harris

G. SITE OPERATOR INFORMATION

1. NAME		2. TELEPHONE NUMBER	
3. STREET	4. CITY	5. STATE	6. ZIP CODE

H. REALTY OWNER INFORMATION (if different from operator of site)

1. NAME		2. TELEPHONE NUMBER	
ENTEX Gas Company, Inc.			
3. CITY		4. STATE	5. ZIP CODE
Houston		TX	77002

I. SITE DESCRIPTION

Coal gasification plant operated late 1800's to early 1900's

J. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☒ 5. PRIVATE

II. TENTATIVE DISPOSITION (complete this section last)

A. ESTIMATE DATE OF TENTATIVE DISPOSITION (mo., day, & yr.)	B. APPARENT SERIOUSNESS OF PROBLEM
	☐ 1. HIGH ☒ 2. MEDIUM ☐ 3. LOW ☐ 4. NONE

C. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	3. DATE (mo., day, & yr.)
Patricia Curl	512-463-7800	Sept. 14, 1988

III. INSPECTION INFORMATION

A. PRINCIPAL INSPECTOR INFORMATION

1. NAME	2. TITLE	
William Tobin, P.E.		
3. ORGANIZATION		**4. TELEPHONE NO. (area code & no.)**
McBride - Ratcliff and Associates, Inc.		713/460-3766

B. INSPECTION PARTICIPANTS

1. NAME	2. ORGANIZATION	3. TELEPHONE NO.

RECEIVED
SUPERFUND
MAY 21 1992
CENTER

C. SITE REPRESENTATIVES INTERVIEWED (corporate officials, workers, residents)

1. NAME	2. TITLE & TELEPHONE NO.	3. ADDRESS

Continued From Front

INSPECTION INFORMATION *(continued)*

D. GENERATOR INFORMATION *(sources of waste)*

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE GENERATED
NA			

E. TRANSPORTER/HAULER INFORMATION

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE TRANSPORTED
NA			

F. IF WASTE IS PROCESSED ON SITE AND ALSO SHIPPED TO OTHER SITES, IDENTIFY OFF-SITE FACILITIES USED FOR DISPOSAL.

1. NAME	2. TELEPHONE NO.	3. ADDRESS
NA		

G. DATE OF INSPECTION *(mo., day, & yr.)*	H. TIME OF INSPECTION	I. ACCESS GAINED BY: *(credentials must be shown in all cases)*
		[X] 1. PERMISSION [ ] 2. WARRANT

J. WEATHER *(describe)*

IV. SAMPLING INFORMATION

A. Mark 'X' for the types of samples taken and indicate where they have been sent e.g., regional lab, other EPA lab, contractor, etc. and estimate when the results will be available.

1. SAMPLE TYPE	2. SAMPLE TAKEN *(mark 'X')*	3. SAMPLE SENT TO:	4. DATE RESULTS AVAILABLE
a. GROUNDWATER			
b. SURFACE WATER			
c. WASTE			
d. AIR			
e. RUNOFF			
f. SPILL			
g. SOIL	X	MBA labs, Houston	
h. VEGETATION			
i. OTHER *(specify)*			

B. FIELD MEASUREMENTS TAKEN *(e.g., radioactivity, explosivity, PH, etc.)*

1. TYPE	2. LOCATION OF MEASUREMENTS	3. RESULTS

Continued From Page 2

IV. SAMPLING INFORMATION (continued)

C. PHOTOS

1. TYPE OF PHOTOS: [X] a. GROUND [ ] b. AERIAL

2. PHOTOS IN CUSTODY OF: McBride - Ratcliff

D. SITE MAPPED?

[X] YES. SPECIFY LOCATION OF MAPS: See attachment 1

E. COORDINATES

1. LATITUDE (deg.-min.-sec.): 29° 45' 39"

2. LONGITUDE (deg.-min.-sec.): 95° 21' 15"

V. SITE INFORMATION

A. SITE STATUS

[ ] 1. ACTIVE (Those inductrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.)

[ ] 2. INACTIVE (Those sites which no longer receive wastes.)

[X] 3. OTHER (specify): (Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.) Not active coal gasification since pre-1929

B. IS GENERATOR ON SITE?

[X] 1. NO [ ] 2. YES (specify generator's four-digit SIC Code): _____

C. AREA OF SITE (in acres): Approx. 4 acres

D. ARE THERE BUILDINGS ON THE SITE?

[ ] 1. NO [X] 2. YES (specify): Maintenance, storage and office buildings

VI. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

X	A. TRANSPORTER	X	B. STORER	X	C. TREATER	X	D. DISPOSER
	1. RAIL		1. PILE		1. FILTRATION		1. LANDFILL
	2. SHIP		2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE		3. DRUMS		3. VOLUME REDUCTION		3. OPEN DUMP
	4. TRUCK		4. TANK, ABOVE GROUND		4. RECYCLING/RECOVERY		4. SURFACE IMPOUNDMENT
	5. PIPELINE		5. TANK, BELOW GROUND		5. CHEM./PHYS./TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER (specify):		6. OTHER (specify):		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
					8. SOLVENT RECOVERY		8. OTHER (specify):
					9. OTHER (specify):		

E. SUPPLEMENTAL REPORTS: If the site falls within any of the categories listed below, Supplemental Reports must be completed. Indicate which Supplemental Reports you have filled out and attached to this for..

[ ] 1. STO[illegible] [ ] 2. INCINERATION [ ] 3. [illegible]NDFILL [ ] 4. SURFACE IMPOUNDMENT [ ] 5. DEEP WELL

[ ] 6. CHEM/BIO/PHYS TREATMENT [ ] 7. LANDFARM [ ] 8. OPEN DUMP [ ] 9. TRANSPORTER [ ] 10. RECYCLOR/RECLAIMER

VII. WASTE RELATED INFORMATION

A. WASTE TYPE

[ ] 1. LIQUID [X] 2. SOLID [ ] 3. SLUDGE [ ] 4. GAS

B. WASTE CHARACTERISTICS

[ ] 1. CORROSIVE [ ] 2. IGNITABLE [ ] 3. RADIOACTIVE [ ] 4. HIGHLY VOLATILE

[X] 5. TOXIC [ ] 6. REACTIVE [ ] 7. INERT [ ] 8. FLAMMABLE

[ ] 9. OTHER (specify):

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

No records

Continued From Front

WASTE RELATED INFORMATION (contin.

2. Estimate the amount (specify unit of measure) of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT: None	AMOUNT: None	AMOUNT: None	AMOUNT: None	AMOUNT: Unknown	AMOUNT:
UNIT OF MEASURE:	UNIT OF MEASURE:	UNIT OF MEASURE:	UNIT OF MEASURE:	UNIT OF MEASURE:	UNIT OF MEASURE:
X (1) PAINT, PIGMENTS	X (1) OILY WASTES	X (1) HALOGENATED SOLVENTS	X (1) ACIDS	X (1) FLYASH	X (1) LABORATORY, PHARMACEUT.
(2) METALS SLUDGES	(2) OTHER(specify):	(2) NON-HALOGNTD. SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(2) HOSPITAL
(3) POTW		(3) OTHER(specify):	(3) CAUSTICS	(3) MILLING/MINE TAILINGS	(3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS SMELTING WASTES	(4) MUNICIPAL
(5) OTHER(specify):			(5) DYES/INKS	(5) NON-FERROUS SMLTG. WASTES	(5) OTHER(specify):
			(6) CYANIDE	(6) OTHER(specify):	
			(7) PHENOLS		
			(8) HALOGENS		
			(9) PCB		
			(10) METALS		
			(11) OTHER(specify):		

D. LIST SUBSTANCES OF GREATEST CONCERN WHICH ARE ON THE SITE (place in descending order of hazard)

1. SUBSTANCE	2. FORM (mark 'X') a. SOLID	b. LIQ.	c. VAPOR	3. TOXICITY (mark 'X') a. HIGH	b. MED.	c. LOW	d. NONE	4. CAS NUMBER	5. AMOUNT	6. UNIT
Acenaphthene	X							83-32-9	1187	mg/kg
Acenaphthylene	X							208-9-68	971	"
Anthracene	X			X				120-12-7	1218	"
Naphthalene	X			X				91-20-3	4235	"
Phenanthrene	X			X				85-01-8	1838	"
Pyrene	X			X				129-00-0	727	"
Fluoranthene	X			X				206-44-0	492	"
Fluorene	X							86-73-7	977	"

VIII. HAZARD DESCRIPTION

FIELD EVALUATION HAZARD DESCRIPTION: Place an 'X' in the box to indicate that the listed hazard exists. Describe the hazard in the space provided.

☐ A. HUMAN HEALTH HAZARDS

None observed

Continued From Page 4

III. HAZARD DESCRIPTION *(continued)*

☐ **B. NON-WORKER INJURY/EXPOSURE**

None

☐ **C. WORKER INJURY/EXPOSURE**

None

☐ **D. CONTAMINATION OF WATER SUPPLY**

None observed

☐ **E. CONTAMINATION OF FOOD CHAIN**

None observed

☐ **F. CONTAMINATION OF GROUND WATER**

Unknown

☐ **G. CONTAMINATION OF SURFACE WATER**

None observed

Continued From Front

VIII. HAZARD DESCRIPTION (continued)

☐ H. DAMAGE TO FLORA/FAUNA

None observed

☐ I. FISH KILL

None

☐ J. CONTAMINATION OF AIR

Unknown

☐ K. NOTICEABLE ODORS

None

☐ L. CONTAMINATION OF SOIL

Unknown

☐ M. PROPERTY DAMAGE

None

Continue On Page 7

Continued From Page 6

VIII. HAZARD DESCRIPTION (continued)

☐ N. FIRE OR EXPLOSION

None

☐ O. SPILLS/LEAKING CONTAINERS/RUNOFF/STANDING LIQUID

None

☐ P. SEWER, STORM DRAIN PROBLEMS

None

☐ Q. EROSION PROBLEMS

Unknown

☐ R. INADEQUATE SECURITY

None

☐ S. INCOMPATIBLE WASTES

None

VIII. HAZARD DESCRIPTION *(continued)*

☐ T. MIDNIGHT DUMPING

Unknown

☐ U. OTHER *(specify)*:

IX. POPULATION DIRECTLY AFFECTED BY SITE

A. LOCATION OF POPULATION	B. APPROX. NO. OF PEOPLE AFFECTED	C. APPROX. NO. OF PEOPLE AFFECTED WITHIN UNIT AREA	D. APPROX. NO. OF BUILDINGS AFFECTED	E. DISTANCE TO SITE *(specify units)*
1. IN RESIDENTIAL AREAS		7200		1 mile
2. IN COMMERCIAL OR INDUSTRIAL AREAS				
3. IN PUBLICLY TRAVELLED AREAS				
4. PUBLIC USE AREAS *(parks, schools, etc.)*				

X. WATER AND HYDROLOGICAL DATA

A. DEPTH TO GROUNDWATER *(specify unit)*	B. DIRECTION OF FLOW	C. GROUNDWATER USE IN VICINITY
2000 - Evangeline	North	Public supply
D. POTENTIAL YIELD OF AQUIFER	**E. DISTANCE TO DRINKING WATER SUPPLY** *(specify unit of measure)*	**F. DIRECTION TO DRINKING WATER SUPPLY**
Unknown	1 1/4 mi	West

G. TYPE OF DRINKING WATER SUPPLY

☒ 1. NON-COMMUNITY < 15 CONNECTIONS ☐ 2. COMMUNITY *(specify town)*: > 15 CONNECTIONS

☐ 3. SURFACE WATER ☐ 4. WELL

Continue On Page 9

Continued From Page 8

X. WATER AND HYDROLOGICAL DATA (continued)

H. LIST ALL DRINKING WATER WELLS WITHIN A 1/4 MILE RADIUS OF SITE

1. WELL	2. DEPTH (specify unit)	3. LOCATION (proximity to population/buildings)	4. NON-COMMUNITY (mark 'X')	5. COMMUNITY (mark 'X')
NA				

I. RECEIVING WATER

1. NAME: Buffalo Bayou

☐ 2. SEWERS ☒ 3. STREAMS/RIVERS ☐ 4. LAKES/RESERVOIRS ☐ 5. OTHER (specify):

6. SPECIFY USE AND CLASSIFICATION OF RECEIVING WATERS

Industrial water supply
Navigation

XI. SOIL AND VEGITATION DATA

LOCATION OF SITE IS IN:

☐ A. KNOWN FAULT ZONE ☐ B. KARST ZONE ☐ C. 100 YEAR FLOOD PLAIN ☐ D. WETLAND

☐ E. A REGULATED FLOODWAY ☐ F. CRITICAL HABITAT ☐ G. RECHARGE ZONE OR SOLE SOURCE AQUIFER

XII. TYPE OF GEOLOGICAL MATERIAL OBSERVED

Mark 'X' to indicate the type(s) of geological material observed and specify where necessary, the component parts.

'X'	A. OVERBURDEN	'X'	B. BEDROCK (specify below)	'X'	C. OTHER (specify below)
	1. SAND			X	Fill materials - intermixed clay, gravel, and concrete
	2. CLAY				
	3. GRAVEL				

XIII. SOIL PERMEABILITY

☐ A. UNKNOWN ☐ B. VERY HIGH (100,000 to 1000 cm/sec.) ☐ C. HIGH (1000 to 10 cm/sec.)

☒ D. MODERATE (10 to .1 cm/sec.) ☐ E. LOW (.1 to .001 cm/sec.) ☐ F. VERY LOW (.001 to .00001 cm/sec.)

G. RECHARGE AREA

☐ 1. YES ☐ 2. NO 3. COMMENTS:

H. DISCHARGE AREA

☒ 1. YES ☐ 2. NO 3. COMMENTS:

I. SLOPE

1. ESTIMATE % OF SLOPE: Less than 1%

2. SPECIFY DIRECTION OF SLOPE, CONDITION OF SLOPE, ETC.: Steep bank next to Buffalo Bayou

J. OTHER GEOLOGICAL DATA

Continue On Reverse

Continued From Front

XIV. PERMIT INFORMATION

List all applicable permits held by the site and provide the related information.

A. PERMIT TYPE (e.g., RCRA, State, NPDES, etc.)	B. ISSUING AGENCY	C. PERMIT NUMBER	D. DATE ISSUED (mo., day, & yr.)	E. EXPIRATION DATE (mo., day, & yr.)	F. IN COMPLIANCE (mark 'X')		
					1. YES	2. NO	3. UNKNOWN

XV. PAST REGULATORY OR ENFORCEMENT ACTIONS

☒ NONE ☐ YES *(summarize in this space)*

NOTE: Based on the information in Sections III through XV, fill out the Tentative Disposition *(Section II)* information on the first page of this form.

Town Gas Project:

Site Name: Houston Gas Light Company

Town gas plants were utilized throughout the United States in the late 1800s and early 1900s to manufacture gas for illumination, cooking, and heating purposes. These plants produced an array of wastes that may have been disposed of on-site. As natural gas became available, the use of the facilities which produced manufactured gas decreased. The environmental concerns associated with these facilities include products/by-products that may not have been utilized and were left in place during closure, wastes that were deposited on-site, and the potential for leaching of these wastes into soils and ground water.

The exact location of the Houston Gas Light Company was determined by researching state archives for old city directories to determine the address of the manufacturing plant and the approximate years of operation. The University of Texas Barker Collection archives contains historic Sanborn fire insurance maps which were used to determine the location of the site and identification of various landmarks which could be related to present day conditions. Due to the extensive changes in the city over the past eighty or a hundred years, it was advantageous to locate a current city map and attempt to relate the circa 1900 Sanborn maps to a current city map.

The present owner/operator of the property on which the old town gas site was located is Entex Gas Company. This is an active concern that uses the site as a maintenance/office complex. A large building covers most of the area of the old town gas site. No attempt was made to contact the owner/operator. The property to the west is owned by David Adickes (northern part) and Union Pacific Company, (southern part).

A Preliminary Assessment (PA) of the site was conducted December 5, 1986 by the TWC. The entire property that was the Houston Gas Light Company is covered by buildings and pavement, therefore no Site Inspection (SI) was planned.

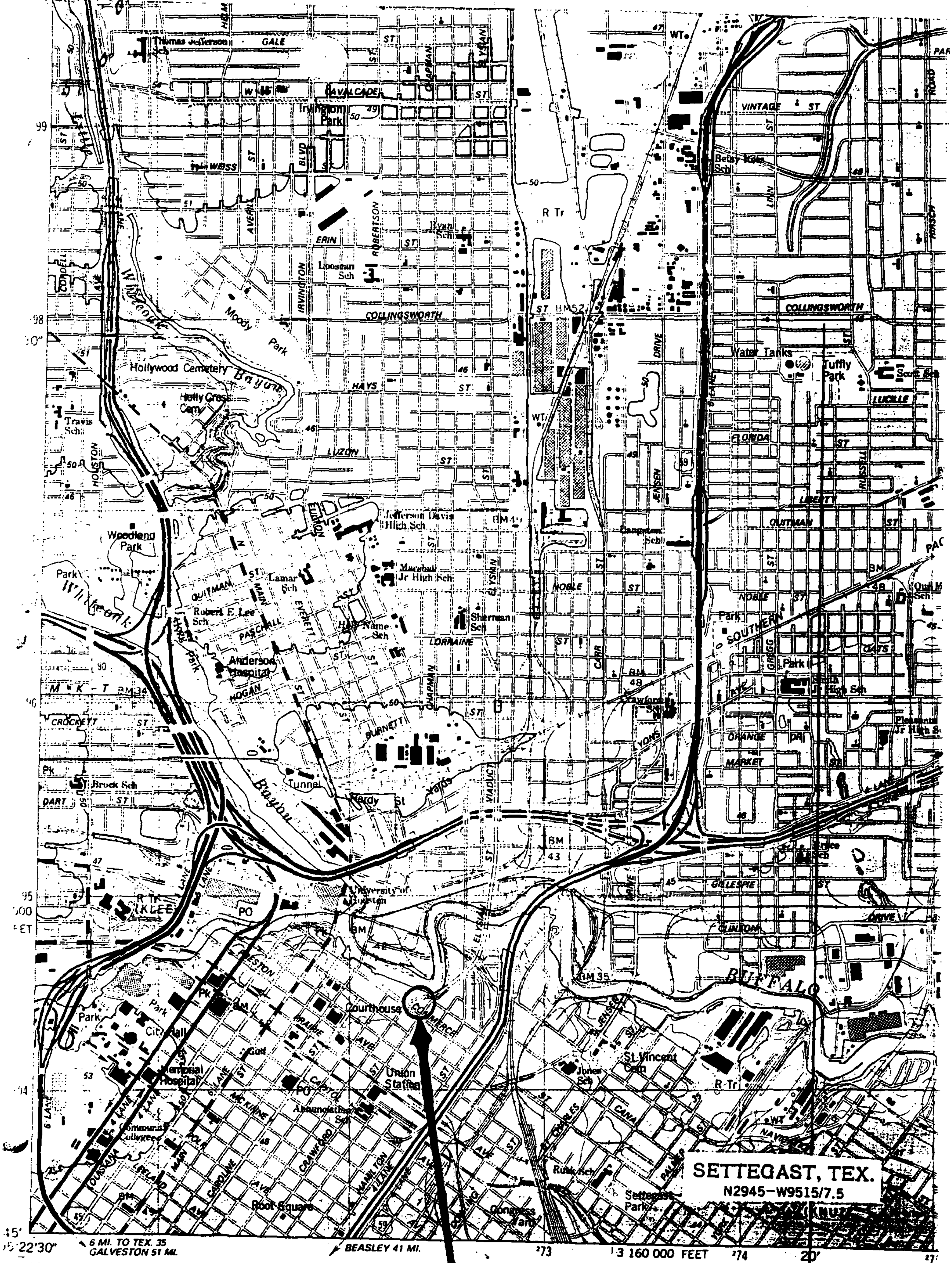
McBride-Ratcliff and Associates, Inc., contacted the TWC on April 6, 1988 regarding the Houston site. They conducted a PA and collected samples for Parkway Detention/Parkway Investments who were considering developing the property. Thirteen soil borings were auger drilled, to depths ranging from 14 to 80 feet. Their report is included as attachment 2.

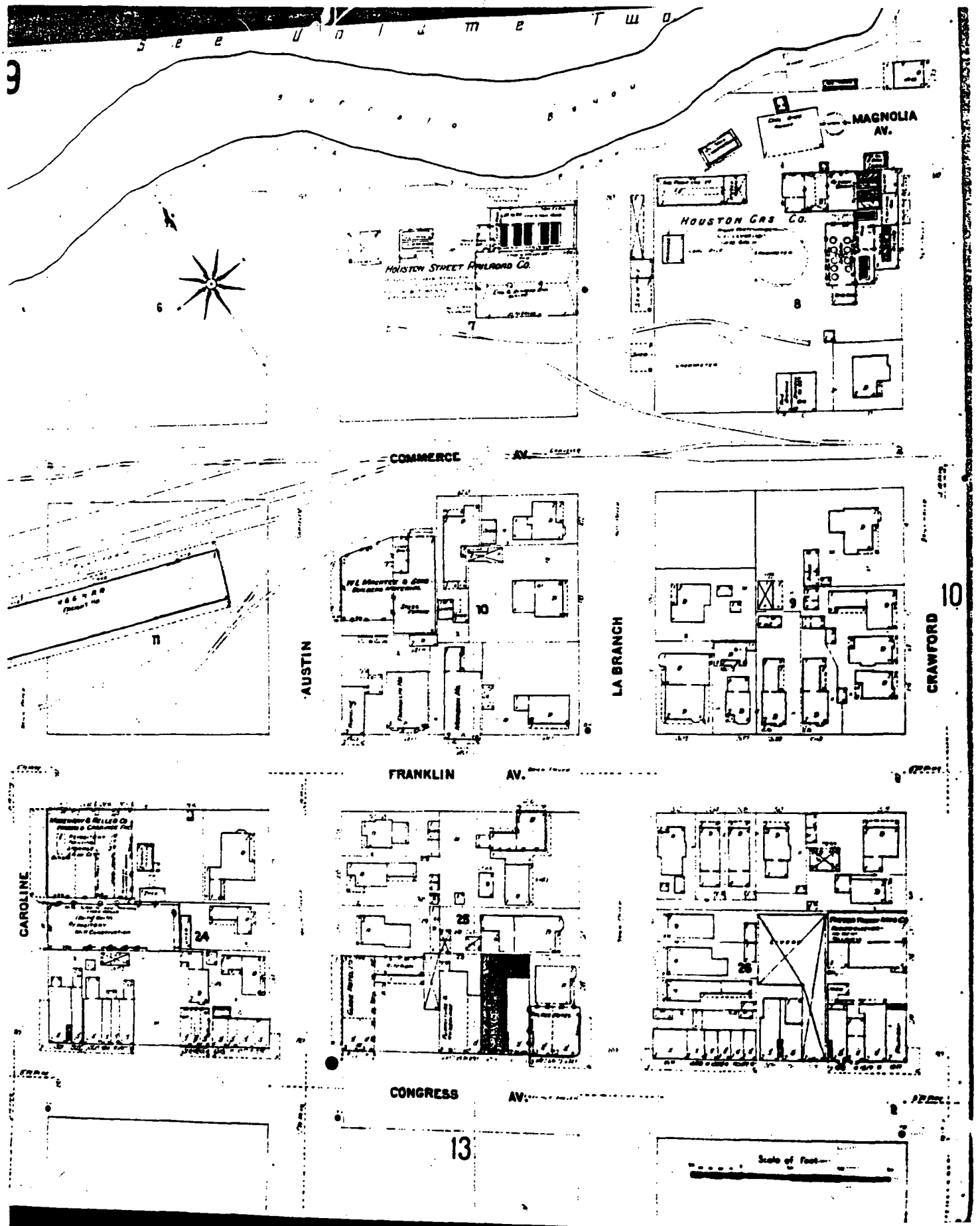
The analytical results indicate high levels of polynuclear aromatic (PNA) compounds. Naphthalene was found at a concentration of 4235 mg/kg, Phenanthrene at 1838 mg/kg, and Anthracene at 1218 mg/kg. Other high concentration PNAs were found. These compounds are characteristically found in manufactured gas plant tars. These PNAs are also nearly always found in soils and are produced by virtually every combustion process. In urban soils, PNAs range from 100 to 175 mg/kg (USEPA 1982). The range of PNA concentrations at the Houston site are well above the range of urban soil background levels.

The concentrations of PNAs at the Houston site are very high however the ground water and surface water in the area are not used for drinking water. Therefore this site is recommended to be considered as a medium level concern.

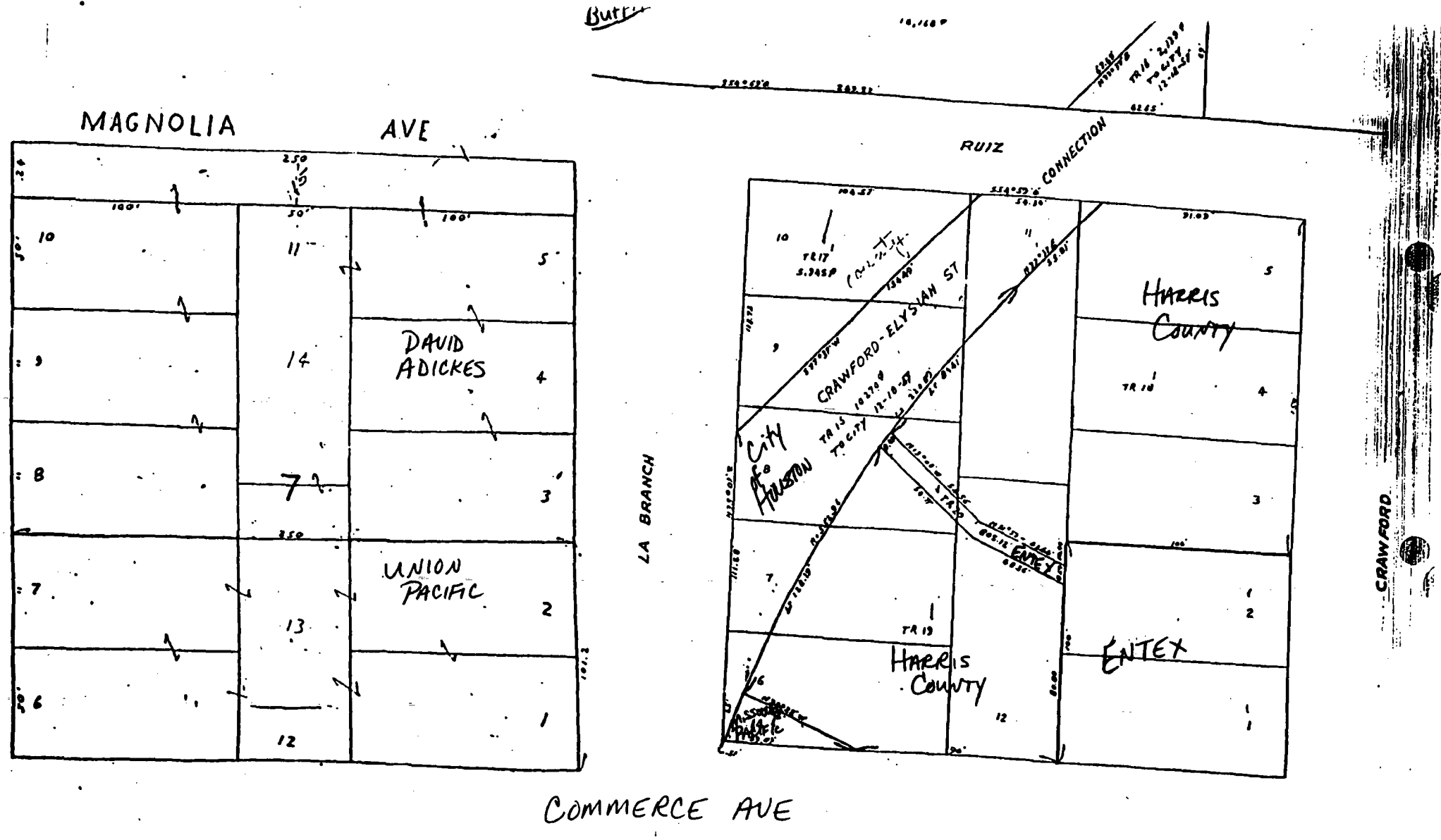
ATTACHMENT 1

LOCATION AND PROPERTY MAPS


SETTEGAST, TEX.
N2945—W9515/7.5
Thomas Jefferson Sch
GALE
CAVALCADE
Irvington Park
WEISS
VINTAGE ST
Betsy Ross Sch
Ryan Sch
Looscan Sch
COLLINGSWORTH
Moody Park
Hollywood Cemetery
Holly Cross Cem
Travis Sch
Water Tanks
Tuffly Park
Scott Sch
LUCILLE
FLORIDA
HAYS ST
LUZON ST
LIBERTY
QUITMAN
Jefferson Davis High Sch
Woodland Park
Lamar Sch
Marshall Jr High Sch
Robert E Lee Sch
Holy Name Sch
Sherman Sch
Langston Sch
NOBLE
LORRAINE
Anderson Hospital
M K T
CROCKETT ST
Crawford Sch
Smith Jr High Sch
Pleasantville Jr High Sch
ORANGE
MARKET
Brock Sch
DART ST
Tunnel
Hardy St Yards
VIADUCT
University of Houston
GILLESPIE
CLINTON
DRIVE
BUFFALO
Courthouse
City Hall
Memorial Hospital
Union Station
PO
Annunciation Sch
Community College
St Vincent Cem
Jones Sch
Ruiz Sch
Settegast Park
Root Square
Congress Yard
R Tr
6 MI. TO TEX. 35
GALVESTON 51 MI.
BEASLEY 41 MI.
3 160 000 FEET
95°22'30"


See Volume Two
9
MAGNOLIA AV.
HOUSTON GAS CO.
HOUSTON STREET RAILROAD CO.
6
7
8
COMMERCE AV.
AUSTIN
LA BRANCH
CRAWFORD
10
11
FRANKLIN AV.
CAROLINE
24
25
26
CONGRESS AV.
13
Scale of Feet

B A Y O U
B A N K
WHARF
MAGNOLIA AV.
HOUSTON GAS CO.
NIGHT WATCHMAN
FUEL CRUDE OIL
LIGHTS GAS
COAL PILE
GASOMETER
GASOMETER
Co.
8
9
80'
NOT PAVED
GRAVELED
BRICK PAVED
RANCH
FORD


MAGNOLIA AVE
DAVID ADICKES
UNION PACIFIC
LA BRANCH
RUIZ
CONNECTION
CRAWFORD-ELYSIAN ST
City of Houston
HARRIS County
ENTEX
CRAWFORD
COMMERCE AVE

ATTACHMENT 2

MCBRIDE - RATCLIFF PA REPORT

PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT
COMMERCE STREET SITE
HOUSTON, TEXAS

FOR

PARKWAY DETENTION
HOUSTON, TEXAS

PREPARED BY

MCBRIDE-RATCLIFF AND ASSOCIATES, INC.
HOUSTON, TEXAS

McBride-Ratcliff and Associates, Inc.
Geotechnical Consultants
7220 Langtry Houston, Texas 77040 713-460-3766

April 21, 1988
MRA Project No: 88-105

Parkway Detention
c/o Parkway Investments, Texas, Inc.
Five Post Oak
Suite 1880
Houston, Texas 77027-3499

ATTENTION: Mr. Richard Rice

SUBJECT: Preliminary Environmental Site Assessment
Commerce Street Site
Houston, Texas

Presented herein is the report of our preliminary environmental site assessment for the Commerce Street Site located in Houston, Texas. This preliminary assessment included a general evaluation of the potential presence of subsurface organic soil contaminants for an approximate 1.43-acre site located at Commerce Street and LaBranch Street in Houston, Texas. This study was authorized on March 22, 1988 and was conducted in general accordance with our proposal dated March 2, 1988 (MRA Proposal No. 88-P046). Preliminary reports of our initial findings were submitted on March 23, 1988 and April 8, 1988.

We appreciate this opportunity to be of service. Please call if you need any additional project information.

Sincerely,

McBRIDE-RATCLIFF AND ASSOCIATES, INC.

Paul R. Wild

William R. Tobin, P.E.

Reviewed By C E Williams

Date 4-21-88

WRT:ka:mm#13
Copies Submitted: 4

CONTENTS

APPENDICES

SUMMARY AND RECOMMENDATIONS

The principal findings and conclusions of our preliminary environmental site assessment for the Commerce Street Site are summarized as follows:

1. According to historic site maps, the Commerce Street Site is shown as the former location of the Houston Electric Company. Adjacent to the Commerce Street Site is the former location of the Houston Gas and Fuel Company. According to the Texas Water Commission (TWC), the Houston Gas and Fuel Company site is listed as a former town gas site which produced coal-tars as a by-product of coal gasification for fuel.

2. The Commerce Street Site is underlain by intermixed clay, gravel, concrete, and asphaltic fill materials to an average depth of 19 ft, with maximum fill material depths to 33 ft. Water levels in open boreholes were encountered at about 28 ft to 34 ft during the time of our study and are generally lower than regional groundwater levels, presumably as a result of drawdown caused by the proximity of the site to Buffalo Bayou.

3. Laboratory organic vapor headspace measurements indicate organic contaminants in both fill materials and natural soils extending to depths of 48 ft. Polynuclear aromatic hydrocarbons and PCBs were detected in five tested soil samples from both the fill materials and the natural soils.

4. We interpret the average depth to residual fill soil contaminants (i.e., oily residues and asphaltic material) to be about 11 ft at four boring locations.

5. We recommend that a copy of this report be submitted to the Texas Water Commission.

INTRODUCTION

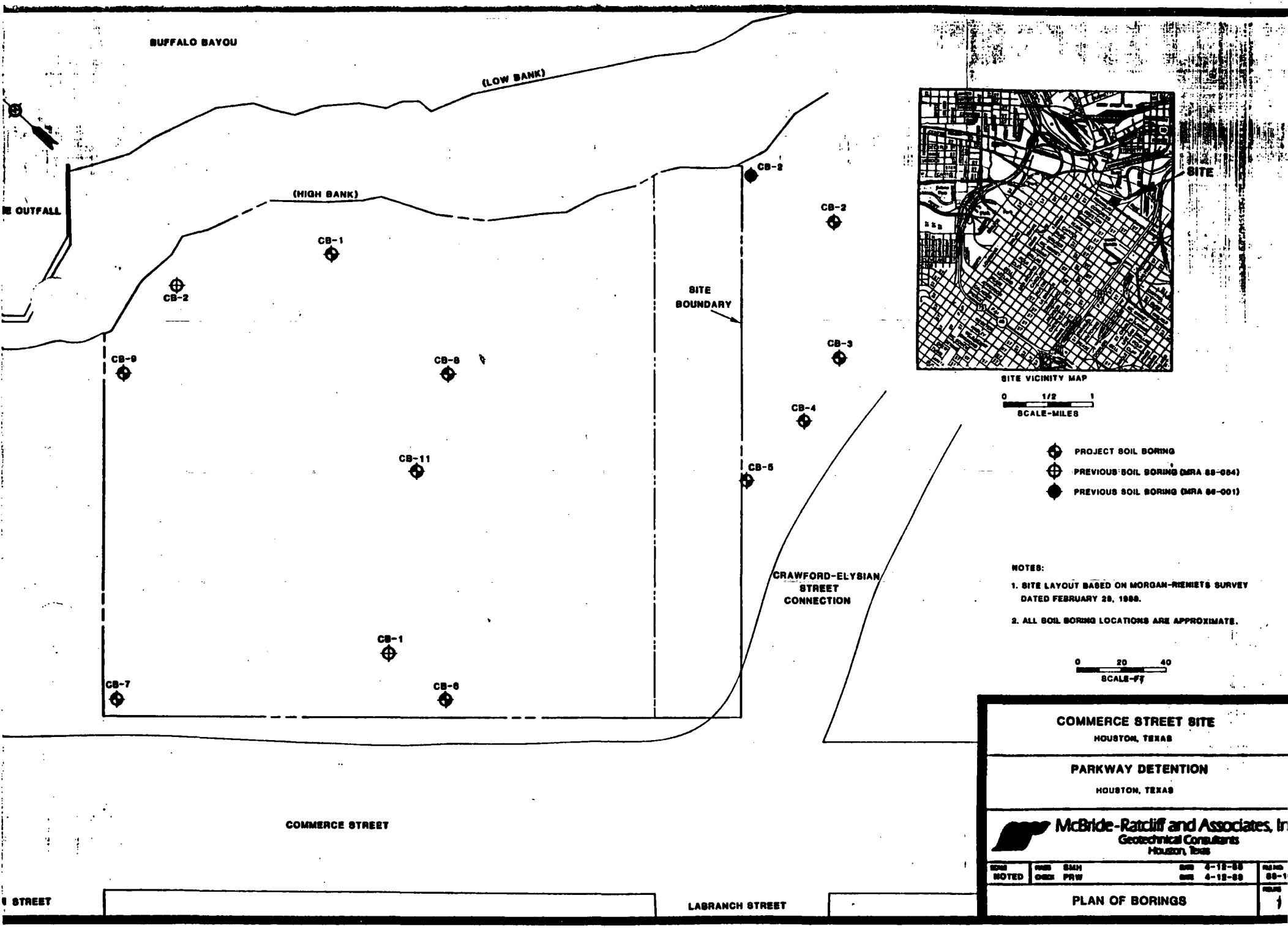
Project Description

The Commerce Street Site includes about 1.4 acres located near the Central Business District in Houston, Texas. The site is bounded by Commerce Street to the south, Buffalo Bayou to the north, and the Elysian Street Viaduct located to the east. The site has been proposed as the location of an extension to the Harris County Sheriff's Department and County Jail.

A preliminary environmental site assessment was conducted to evaluate the potential for environmental risks associated with former site operations and possible site impacts from adjacent site operations. A site location map is presented on Figure 1.

Background

A preliminary geotechnical evaluation of the Commerce Street Site was conducted by McBride-Ratcliff and Associates (MRA) and included drilling two exploratory soil borings (MRA Report No. 88-084, dated March 1, 1988). Results of the preliminary geotechnical evaluation indicated the presence of organic vapors in recovered soil samples. An adjacent soil boring located near the site was drilled for another geotechnical study and disclosed the presence of possible subsurface hydrocarbons (MRA Report No. 86-001, dated April 20, 1987). In addition, a preliminary review of the Texas Water Commission (TWC) Town Gas Sites file indicated that the Commerce Street Site may have been associated with a former town gas facility and


BUFFALO BAYOU
(LOW BANK)
(HIGH BANK)
E OUTFALL
CB-1
CB-2
CB-2
CB-2
SITE BOUNDARY
CB-3
CB-4
CB-5
CB-8
CB-9
CB-11
CB-1
CB-7
CB-6
CRAWFORD-ELYSIAN STREET CONNECTION
COMMERCE STREET
STREET
LABRANCH STREET
SITE
SITE VICINITY MAP
0 1/2 1
SCALE-MILES
PROJECT SOIL BORING
PREVIOUS SOIL BORING (MRA 88-004)
PREVIOUS SOIL BORING (MRA 86-001)
NOTES:
1. SITE LAYOUT BASED ON MORGAN-RIEMIETS SURVEY DATED FEBRUARY 28, 1988.
2. ALL SOIL BORING LOCATIONS ARE APPROXIMATE.
0 20 40
SCALE-FT
COMMERCE STREET SITE
HOUSTON, TEXAS
PARKWAY DETENTION
HOUSTON, TEXAS
McBride-Ratcliff and Associates, Inc.
Geotechnical Consultants
Houston, Texas
SCALE NOTED
DRWN SMH
CHKD PRW
DATE 4-12-88
DATE 4-12-88
PLAN OF BORINGS

therefore future regulatory actions may be planned. In response to these items, a preliminary environmental site assessment was conducted to evaluate the potential for environmental risks.

Approach

The primary objective of the preliminary environmental site assessment was to provide an evaluation of the potential for environmental risks. Specifically, our approach was based upon obtaining and analyzing limited soil samples for coal tar derivatives and PCBs as an indication of the presence or absence of subsurface organic contaminants.

Scope of Work

The scope of work for the preliminary environmental site assessment was organized into four primary work tasks that are described as follows:

Task 1 - Site History. Task 1 included a review of the following three data sources to obtain initial information pertaining to the site history:

1. Houston library archives
2. Texas Water Commission (TWC)
3. Historical aerial photographs

Site historical information was reviewed to assist in developing the preliminary phase sampling and analytical program and further aided in evaluating the general character of the site.

Task 2 - Field Exploration. Task 2 included drilling ten soil borings throughout the depth of the on-site fill materials and into natural soils to obtain soil samples for subsequent analytical testing and to characterize subsurface soil conditions.

Task 3 - Laboratory Testing. Laboratory headspace measurements were obtained with a portable photoionization detector to assist in selecting soil samples to be composited for subsequent analytical testing. A total of five soil samples (4 composite soil samples and 1 blind duplicate sample) were analyzed for the following EPA Hazardous Substance List (HSL) constituents:

Item	Constituents
Semivolatile Organics (base/neutral/acid extractables)	69
Pesticides/PCBs	27

Task 4 - Report. Results from Tasks 1 to 3 are documented in this engineering report. The report includes descriptions of the field and analytical testing procedures and specifically addresses the following items:

1. General site history and regulatory status.

2. Fill conditions, including the depth and nature of the fill materials.

3. Soil analytical test results.

SITE HISTORY

Houston Library Archives

Copies of historical Sanborn fire insurance maps were obtained from the City of Houston Library archives for the years 1890 and 1950. The maps were reviewed to obtain data concerning previous site activities, surface features of potential environmental concern, and previous site and nearby site owners.

Texas Water Commission Files

Contact was made with representatives of the Texas Water Commission (TWC) concerning the TWC Town Gas Project, because of the possibility of association with former "town gas" facilities. Additionally, TWC Houston town gas site files were also reviewed to obtain data concerning current regulatory site status.

Historical Aerial Photographs

Historical aerial photographs were obtained from the U.S.D.A. Agricultural Stabilization and Conservation Services (ASCS) for the following years:

Year	Photograph Number	Approximate Scale
1953	BQY-13M-121D	1 in = 200 ft
1957	BQY-4T-138D	1 in = 200 ft
1964	BQY-3FF-147C	1 in = 200 ft
1973	48201-173-201D	1 in = 400 ft
1981	48201-281-126L	1 in = 400 ft

The historical aerial photographs were used to review the former site features and to assess the potential presence of surficial anomalies which could indicate former pits, storage tanks, or environmentally significant activities.

FIELD EXPLORATION

Soil Borings

A total of ten project soil borings were drilled during the preliminary environmental site assessment. Including three soil borings from previous MRA studies, a total of 13 soil borings were drilled to assess site and nearby subsurface soil conditions. The ten project soil boring depths ranged from 14-ft to 46-ft depths, whereas the three previous soil borings ranged from 30-ft to 80-ft depths. The soil boring locations are shown on Figure 1.

Dry-augering drilling techniques were used to advance the project boreholes. Cohesive samples were generally obtained by hydraulically advancing a 3-in. diameter, thin-walled steel Shelby tube at approximate 2-ft continuous intervals. Non-cohesive samples were generally obtained at approximate 1.5-ft continuous intervals by driving a 2-in diameter, steel split-spoon barrel sampler using a 140-lb hammer dropped about 30 inches. Upon completion, project soil borings were pressure-grouted with a cement-bentonite grout from the bottom of each borehole to the surface to reduce the potential for strata cross-contamination. Excess soil cuttings from the boreholes were collected and placed into metal drums and transported to our Houston laboratory for disposal (small quantity hazardous waste generator exemption).

Soil Sampling

Recovered soil samples were visually field-classified by our geologist. The samplers were cleaned between each sampling interval with a detergent wash followed by a

methanol rinse. Field headspace measurements of soil organic vapors were made with a portable photoionization detector. Notations of soil discolorations and odors were recorded. Recovered soil samples were placed into detergent-washed glass jars with Teflon-lined lids and stored on ice in portable coolers for transport to our Houston laboratory with chain-of-custody documentation. All field activities were conducted in accordance with an OSHA site safety plan (29 CFR 1910.120). Project soil boring logs are presented in Appendix A and include our interpretations of general subsurface conditions at the soil boring locations. Soil classifications presented on the soil boring logs are based on visual field classification and have not been verified by laboratory soil testing. Previous on-site soil boring logs are included in Appendix B.

LABORATORY TESTING

Laboratory testing of selected soil samples included sample headspace measurements of total organic vapors for sample screening and analytical testing for organic compounds.

Sample Screening

In addition to visual classification, recovered soil samples were screened for total organic vapors. Headspace total organic vapor concentrations were obtained in the MRA laboratory with an isobutylene-calibrated HNU PI 101 photoionization detector equipped with a 10.2 eV lamp. The majority of aromatic hydrocarbon compounds have ionization potentials less than 10.2 eV and are therefore generally detectable by photoionization techniques. Results of the soil organic vapor measurements are summarized on the soil boring logs presented in Appendix A and are presented as naphthalene-equivalent concentrations.

The soil organic vapor screening results are reported as total organic vapors, based on a conversion factor to naphthalene equivalents. Naphthalene is a polynuclear aromatic hydrocarbon (PAH) commonly found in coal tars, coal tar distillates, and some petroleum distillates.

The headspace measurement results are for sample screening purposes only to assist in selection of soil samples for subsequent analytical testing, and are used only to assess the potential presence of contaminants. Precise quantitative analysis of volatile organic compounds is not applicable to photoionization detection screening methods and depends on temperature, vapor pressure, ionization potential, headspace volume, etc. The photoionization detector will also detect some trace inorganic gases that may not be suitable for contaminant indicators.

Analytical Testing

Based on the results of the soil organic vapor screening and field sampling notations, discrete soil samples were selected and composited into five soil samples, including one duplicate, for subsequent analytical testing. The duplicate soil sample was analyzed as a quality assurance measure to assess the reproduceability of intra-laboratory data. Listed as follows is the summary of the selected soil samples, their corresponding composite sample number, and the general soil strata from which they were obtained.

Analytical Soil Testing Summary

Sample No.	Soil Boring/Depth (ft.)	Strata
1. Composite 2	CB-2, 9-11	Fill
	CB-2, 11-13	Fill
	CB-2, 13-15	Fill

Sample No.	Soil Boring/Depth (ft.)	Strata
2. Composite 4	CB-4, 6-8	Fill
	CB-4, 10-12	Fill
	CB-4, 12-14	Fill
3. Composite 5A	CB-5, 30-32	Natural Clays
	CB-5, 32-34	Natural Clays
	CB-5, 38-40	Natural Clays
4. Composite 5B	CB-5, 42-43	Water-Bearing Sand
	CB-5, 44-46	Water-Bearing Sand
5. Composite 56C	CB-5, 30-32	Natural Clays
(Composite 5A Duplicate)	CB-5, 32-34	Natural Clays
	CB-5, 38-40	Natural Clays

Analytical test assignments were based upon sample selections with (1) positive headspace screening; (2) visual and olfactory responses; and (3) key geologic strata representing both the fill soils and the natural soils.

The composited soil samples were analyzed for EPA Hazardous Substance List (HSL) semivolatile organic compounds (69) and pesticides/PCBs (27) by MBA Labs in Houston, Texas. HSL semivolatile compounds were selected for analysis based upon our experience that coal tar constituents are typically detected in this fraction. PCBs were also selected for analysis based upon our experience that PCBs were commonly used by the electric power industry as a constituent of cooling and lubricating oils. Historical data indicates the past presence of both on-site underground oil tanks and adjacent-site coal tar piles (coke). Results of the laboratory testing are included in Appendix C.

FINDINGS

Our preliminary interpretations of subsurface conditions are based upon information at the boring locations only and relatively limited, select soil samples. This information has been used as the basis for our preliminary conclusions. However, significant variations in subsurface conditions at areas not explored by soil borings and in samples not selected for analytical testing may be present and will require re-evaluation of our conclusions.

Site History

A review of the historic Sanborn fire insurance maps indicates that the Houston Electric Company was previously located at the Commerce Street site. Features from Houston Electric Company identified from the maps include an elevated water tank, underground oil tanks, a crude oil tank, a generating unit, and a machine shop. Coke piles and an underground oil tank are shown adjacent to the east border at the Houston Gas & Fuel Company Site.

Conversations with representatives of the Texas Water Commission (TWC) indicate that the Houston Gas and Fuel Company previously operated a 4-acre site located south of Ruiz (Magnolia) between LaBranch and Crawford, north of Commerce. This site is located adjacent to the east boundary of the Commerce Street Site. The former Houston Gas and Fuel Company Site was included with the TWC Town Gas Project. The Town Gas Project was initiated because of possible environmental concerns from "town gas" facilities which used coal to produce fuel for illuminating street lamps. It was common practice to dispose of the coal tar by-products created during the heating (or gasification) of coal into unlined on-site disposal pits. Based on verbal

information from TWC, it does not appear that the Commerce Street Site was included with the Houston Gas and Fuel Town Gas Site.

A review of TWC files indicates that a site visit of the Houston Gas and Fuel Site was conducted by the TWC on December 5, 1986. Results of the site visit indicate that the current (1986) owner/operator of the property on which the town gas site was located is Entex Gas Company. A site inspection was conducted by the EPA on June 19, 1987 and concluded that because no historical or visual evidence of on-site disposal sites was noted, no further regulatory investigative action was recommended.

A review of the 1953 Agricultural Stabilization and Conservation Service (ASCS) photograph indicates that the site was primarily vegetated with low-lying brush and a few trees at the time of the aerial reconnaissance. No commercial or industrial activities or buildings are evident, nor do there appear to be fill piles or open pits. However, some commercial and/or industrial activity is evident in the 1959 ASCS photograph. Access roads and apparent railroad freight cars or truck trailers are evident throughout the majority of the site. The site was apparently largely unused by 1964, which is evident by the relative absence of railroad freight cars or truck trailers, except for those adjacent to Commerce Street. The 1973 ASCS photograph indicates that the site was abandoned, based on the lack of railroad freight cars or truck trailers and access roads. The 1981 ASCS photograph indicates that the site had been paved and was being used as a car parking lot. Our interpretations of the historical aerial photographs revealed no on-site surficial

anomalies potentially associated with former Houston Gas and Fuel Company or Houston Electric Company activities. However, the photographic coverage may post date the time of the former site operations.

Soil Stratigraphy

Data obtained from the field exploration program were used to prepare the soil boring logs presented in Appendix A and Appendix B. A review of the soil boring logs indicates that fill materials were encountered at both project and previous soil borings ranging from 9-ft to 33-ft depths, with an average fill depth of about 19 ft. Fill materials generally consisted of gray clays with some layers of tan and reddish brown silty clays intermixed with concrete, gravel, and asphaltic materials. Asphaltic materials were encountered in four soil borings along the northern and eastern site boundaries at about 11-ft to 13-ft depths (Borings CB-1 to CB-4). Oily residues were evident in the fill materials of two soil borings (Borings CB-1 and CB-4) at about 4-ft to 6-ft depths, and petroleum odors were noted in all soil boring fill materials. Four soil borings could not be advanced beyond about 14-ft to 16-ft depths due to subsurface obstructions (Borings CB-2, CB-3, CB-8, CB-11).

Soil borings located near the edge of the Buffalo Bayou high bank near the northeastern site boundary which penetrated through the fill materials (Borings CB-1 and CB-9) indicate a firm to medium tan silty sand from about 18 ft to below 33 ft. The soil boring log for the previous Boring CB-2 (86-084) indicates that the sand layer may extend to about 48 ft.

Project and previous soil borings located further away from Buffalo Bayou indicate layers of natural gray clays, silty clays, and sandy clays from approximately 16-ft to 35-ft depths (Borings CB-4, CB-5, CB-6, CB-7 and previous Boring CB-1). Boring CB-5 and previous Boring CB-2 (86-001) located near the eastern and northeastern site boundaries indicate a silty clay from about 33-ft to 42-ft. The soil boring logs for previous Borings CB-2 (86-001) and CB-2 (88-084) indicate layered sands, silts, and clays from about 40 ft to 80 ft.

Free water in open boreholes was encountered at about 28 ft to 34 ft. The water levels are interpreted to be depressed as a result of drawdown influences caused by proximity to Buffalo Bayou. The observed depth to water in the open boreholes during the time of our field exploration is recorded on the boring logs. Accurate determination of groundwater levels is usually made from open standpipe piezometers. Water levels measured in open boreholes may not accurately reflect true groundwater conditions and therefore should be only considered as approximate indications of groundwater levels. Generally higher groundwater levels are expected away from Buffalo Bayou.

Laboratory Testing

Results of the soil organic vapor screening indicate that sample headspace organic vapors were present in eight of 10 project soil borings, based on a criterion of 3 parts per million (ppm) naphthalene equivalents minimum photoionization detector response. Below 3 ppm naphthalene equivalents, the positive correlations between visual oily residues/asphaltic materials, olfactory responses, and photoionization detector responses were variable. The highest measured photoionization detector responses were

noted in Boring CB-5 soil samples, which had positive responses ranging from 11 ppm to 119 ppm naphthalene equivalents for soil samples from 30 ft to 42 ft. However, positive responses in project soil samples generally ranged from about 3 ppm to 20 ppm naphthalene equivalents, with a few project soil samples ranging up to 55 ppm. Generally, the two or three samples with the greatest responses from select soil borings were chosen for compositing and subsequent analytical testing. The higher headspace measurements were generally obtained from soil borings located near the eastern site boundary.

A summary of the analytical test results for detected constituents is presented in Table 1.

Table 1
Summary of Analytical Test Results (mg/kg) (ppm)

	Composite Number				
Analysis	2	4	5A	5B	56C(5A Dup)
Semivolatiles					
Acenaphthene	144	1187	24	31	87
Acenaphthylene	663	971	61	28	205
Anthracene	166	1218	34	24	128
Benzo(a)anthracene	110	246	20	11	76
Benzo(a)pyrene	43	<5	<10	<1	<5
Benzo(b)fluoranthene	86	318	<10	<1	7
Benzo(ghi)perylene	16	<5	<10	<1	<5
Chrysene	105	185	50	7	93
Fluoranthene	253	492	34	30	136
Fluorene	526	977	163	60	185
Indeno(1,2,3-cd)pyrene	16	<5	<10	<1	<5
Naphthalene	2661	4235	665	435	2026
Phenanthrene	940	1838	50	123	58
Pyrene	337	727	34	144	209
Total Semivolatiles	6066	12394	1135	893	3210
Pesticides/PCBs					
PCB-1254	0.001	0.013	0.002	0.116	0.290

The results of the analytical testing indicate that the predominant constituents in the tested soil samples were polynuclear aromatic hydrocarbons (PAH), which are typical

coal tar and coal-tar distillate constituents. The total PAH concentrations ranged from 893 mg/kg for the Composite 5B soil sample to 12,394 mg/kg for the Composite 4 soil sample. PCB-1254 was also detected in each tested soil sample from 0.001 mg/kg for the Composite 2 soil sample to 0.290 mg/kg for the Composite 5A duplicate soil sample (Composite 56C). The MRA chemistry lab independently verified the presence of PCB-1254 in Composite 5A with a gas chromatograph-electron capture detector instrument using EPA Method 8080.

PRELIMINARY CONCLUSIONS

Based on our review of site historical data, field exploration data, and laboratory test data, the following preliminary conclusions are noted:

1. TWC files and Sanborn fire insurance maps indicate that the Commerce Street Site was formerly the site of the Houston Electric Company, which apparently used underground and above-ground oil storage tanks. The adjacent property was formerly occupied by the Houston Gas and Fuel Company, which produced coal tars as a by-product of coal gasification for fuel.

2. Our interpretation of ASCS historical aerial photographs does not indicate the presence of on-site surficial anomalies potentially associated with former Houston Electric Company and Houston Gas and Fuel Company operations. However, aerial photograph coverage may post date the time of the former site operations.

3. The soil stratigraphy at depths less than about 40 ft is variable throughout the site. The field exploration program indicates average fill material depths to about 19 ft, with fill material depths ranging from 9 ft to 33 ft. Black asphaltic materials were encountered at about 11-ft to 13-ft depths in four soil borings, overlain by soils that are relatively free of asphaltic and tar-substances. This may indicate that coal tars were previously disposed on-site and then covered by relatively clean construction debris and fill soils. A natural sand layer extends to a depth of about 48-ft throughout the northwestern portion of the site. A natural silty clay extends from about 33-ft to 42-ft depths along the northeastern portion of the site. Layered sands, silts, and clays are present from about 40-ft to 80-ft depths. Free water in open boreholes was encountered at about 28-ft to 34-ft depths.

4. Based on olfactory and photoionization detector responses, soil borings throughout the site indicated the presence of organic vapors in fill materials and natural soils from about 3-ft to 48-ft depths. However, soil odors and headspace results within the shallow fill soils may indicate possible vapor-phase constituents emanating from deeper residual soil contaminants, such as oily residues and asphaltic materials. Positive photoionization detector responses were generally in the 3 ppm to 20 ppm range, with a maximum response of 119 ppm.

5. Laboratory testing detected the presence of PAH compounds and PCBs in both fill materials and natural soils, possibly indicating that vertical subsurface contaminant migration has occurred. The presence of

PAH compounds indicates that coal tar residuals remain in site fill materials. Insufficient data is available to assess the source of PCBs at the site.

6. Based upon our preliminary interpretations of the field and laboratory data, the average depth to residual fill soil contaminants (i.e., oily residues and asphaltic material) is estimated at 11 ft at four soil boring locations. Organic vapor concentrations and soil odors less than 11-ft depth may be attributed to vapor-phase constituents emanating from the deeper residual contaminants.

LIMITATIONS

This preliminary environmental site assessment was conducted to evaluate the potential for environmental risks and is based on analytical testing of limited, selected subsurface soil samples for organic compounds. Results of the analytical testing disclosed the presence of polynuclear aromatic hydrocarbons (PAH) and polychlorinated biphenyls (PCBs), which indicate the potential for environmental risks.

A detailed remedial investigation is necessary to define the extent and magnitude of the subsurface contaminants and thereby evaluate environmental risks. Environmental risk assessments typically include evaluation of contaminant migration pathways relative to exposure of contaminants to human, animal, and plant life. In the event environmental risks are indicated, then appropriate remedial measures can be assessed.

APPENDIX A

PROJECT SOIL BORING LOGS

LOG OF BORING

Project : Commerce Street Environmental Site Assessment
Client : Parkway Detention Houston, Texas

Boring No. : CB-1
File No. : 88-105
Date : 3-15-88
Elevation : - ft.

Dry Augered 0 to 35 ft. Water at 33 feet; Caving at 32.5 ft.
Wash Bored to ft. Water at ft. after 3.5 hours

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm.
0		Tan & gray CLAY (CH) "FILL"							
									0
		-oily residue & petroleum odor 4'-5'							1
5		-reddish brown, gray, & tan 5'-11'							0
									0
		-petroleum odor 9'-10'							1
10									0
		-gray & tan 11'-13'							0
		-dark gray & black sandy clay, sand & gravel intermixed w/asphaltic material & oily residue below 13'							0
15									0
		Firm tan SILTY SAND (SM)							0
	6/6 8/6 9/6								0
20		-loose @ 21'							
	4/6 3/6 7/6								0
	5/6 8/6 10/6								0
25	7/6 12/6 6/6								1
	6/6 10/6 12/6								0
	8/6 10/6 17/6								1
30	Boring Continues								

Bottom @ 35'

HSRD = Head Space Reading

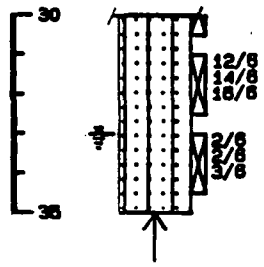
McBride-Ratcliff and Associates, Inc.

LOG OF BORING

Project : Commerce Street Environmental
Site Assessment
Client : Parkway Detention
Houston, Texas

Boring No. : CB-1
File No. : 88-105
Date : 3-15-88
Elevation : - ft

Dry Augered 0 to 35 ft. Water at 33 feet; Caving at 32.5 ft
Wash Bored to ft. Water at ft. after 3.5 hours

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm
30		Firm tan SILTY SAND (SM)							
		-tan & brown @ 31'							0
		-tan silty sand @ 33'							0

Bottom @ 35'

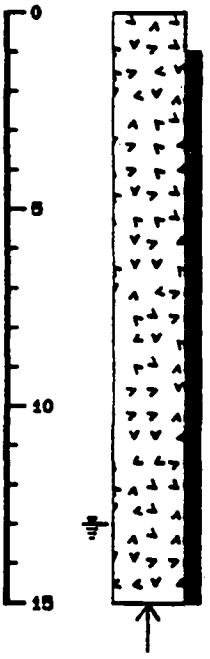
HSRD = Head Space Reading

LOG OF BORING

Project : Commerce Street Environmental Site Assessment
Client : Parkway Detention Houston, Texas

Boring No. : CB-2
File No. : 88-105
Date : 3-15-88
Elevation : - ft

Dry Augered 0 to 15 ft. Water at 13 feet; Caving at 14 ft
Wash-Bored to ft. Water at ft. after 5 minutes



ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm
		CLAY (CH) "FILL"							
		-gray & dark gray to 5'							0
		-intermixed gravel & petroleum odor 3'-5'							0
		-petroleum odor 5'							1
		-reddish brown & gray 5'-7'							
		-brown, gray, & dark gray 7'-9'							0
		-petroleum odor below 9', gray & reddish brown w/calcareous nodules 9'-11'							5
		-asphaltic material below 13'							17
									14

Bottom @ 15'

HSRD = Head Space Reading

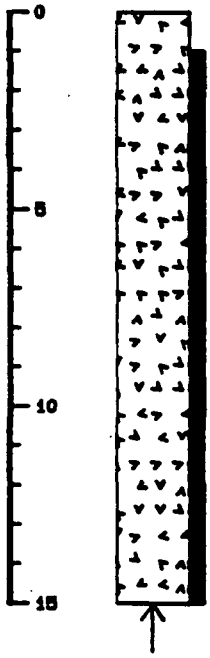
McBride-Ratcliff and Associates, Inc.

LOG OF BORING

Project : Commerce Street Environmental Site Assessment
Client : Parkway Detention Houston, Texas

Boring No. : CB-3
File No. : 88-105
Date : 3-15-88
Elevation : - ft

Dry Augered 0 to 15 ft. Water at feet; Caving at ft
Wash Bored to ft. Water at ft. after

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Mc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSR ppm
0		CLAY (CH) "FILL" -gray & reddish brown to 7'							0
									1
5		-gray & tan 7'-9'							0
									0
		-petroleum odor below 9', reddish brown & gray 9'-11'							4
10		-gray & black asphaltic material below 11'							38
									11
15									

Bottom @ 15'

HSRD = Head Space Reading

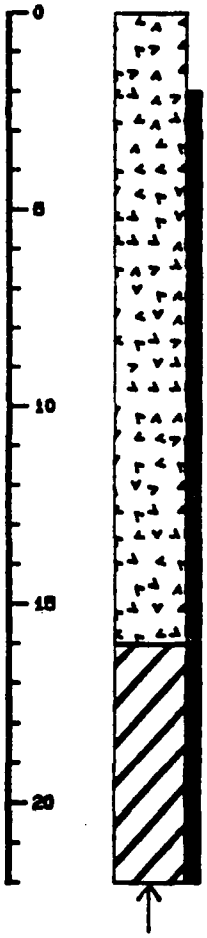
McBride-Ratcliff and Associates, Inc.

LOG OF BORING

Project : Commerce Street Environmental
Site Assessment
Client : Parkway Detention
Houston, Texas

Boring No. : CB-4
File No. : 88-105
Date : 3-15-88
Elevation : - ft

Dry Augered 0 to 22 ft. Water at feet; Caving at ft
Wash-Bored to ft. Water at ft. after



ELEV / DEPTH	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm
	CLAY (CH) "FILL" -brown to 6' -petroleum odor 2'-3' -intermixed gravel & bricks 4'-6' -gray below 6' -petroleum odor below 6' -oily residue, 6'to 12' -intermixed shell & gravel 10'-12' -intermixed black asphaltic material below 12'							0 1 88 8 11 9 7
	Reddish brown & gray CLAY (CH) -slickensides 18'-20' -gray below 20'							3 1 2

Bottom @ 22'

HSRD = Head Space Reading

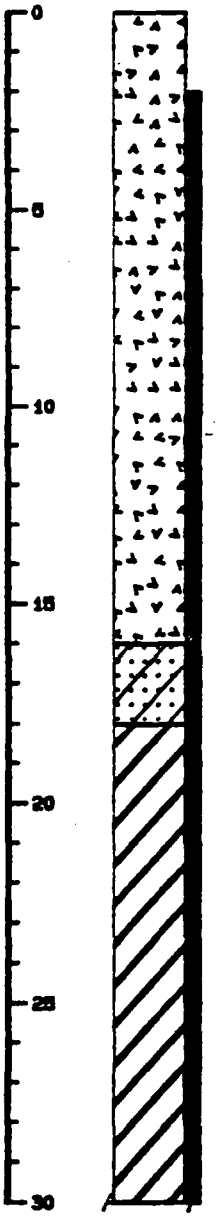
McBride-Ratcliff and Associates, Inc.

LOG OF BORING

Project : Commerce Street Environmental Site Assessment
Client : Parkway Detention Houston, Texas

Boring No. : CB-5
File No. : 88-105
Date : 3-15-88
Elevation : - ft.

Dry Augered 0 to 46 ft. Water at 34 feet; Caving at 35 ft.
Wash Bored to ft. Water at ft. after 5 minutes

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm.
0		CLAY (CH) "FILL"							
		-gray to 4'							
		-intermixed gravel, glass, & shell 2'-8'							2
5		-brown silty sand layer 4'-6'							0
		-brown silty clay 6'-8'							1
		-brown sandy clay 8'-10'							0
10		-dark gray & gray clay below 10'							0
									0
15									0
		Gray CLAYEY SAND (SC)							0
		Gray CLAY (CH)							0
20		-gray & tan 20'-22', ferrous nodules & claystones 20'-30'							0
		-reddish brown & gray 22'-35'							0
25									0
									0
		-petroleum odor below 28'							1
30	Boring Continues								

Bottom @ 46'

HSRD = Head Space Reading

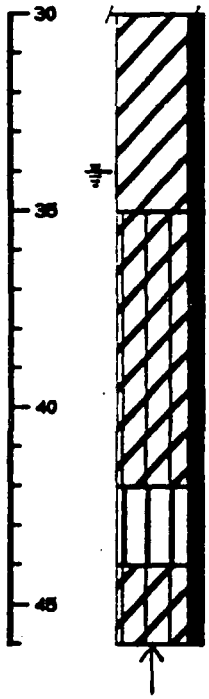
McBride-Ratcliff and Associates, Inc.

LOG OF BORING

Project : Commerce Street Environmental Site Assessment
Client : Parkway Detention Houston, Texas

Boring No. : CB-5
File No. : 88-105
Date : 3-15-88
Elevation : - ft

Dry Augered 0 to 46 ft. Water at 34 feet; Caving at 35 ft
Wash-Bored to ft. Water at ft. after 5 minutes

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm
30		Gray CLAY (CH) -oily residue & silt seams below 30'							34
									119
									84
35		Reddish brown SILTY CLAY (CL) w/silt pockets -oily residue & petroleum odor to 40'							71
									101
40									11
		Reddish brown SILT (ML)							1
		Reddish brown SILTY CLAY (CL) w/silt seams							1
45									

Bottom @ 46'

HSRD = Head Space Reading

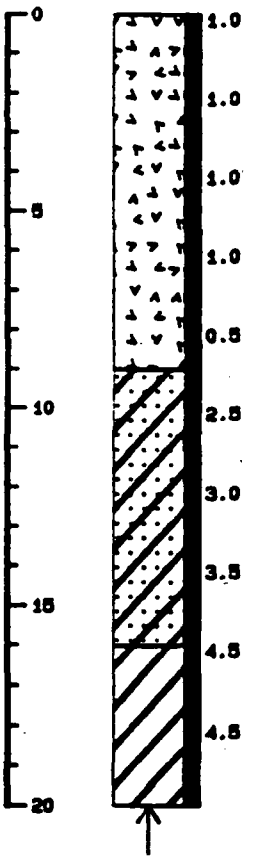
McBride-Ratcliff and Associates, Inc.

LOG OF BORING

Project : Commerce Street Environmental
Site Assessment
Client : Parkway Detention
Houston, Texas

Boring No. : CB-6
File No. : 88-105
Date : 4-2-88
Elevation : - ft.

Dry Augered 0 to 20 ft. Water at feet; Caving at ft.
Wash Bored to ft. Water at ft. after



ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm.
		Medium dark & light gray CLAY (CH) "FILL"							0
		-w/sand pockets & gravel							0
									0
									0
		Stiff light gray & tan SANDY CLAY (CL)							0
									2
		-sand pockets below 14'							1
		Very stiff light gray & tan CLAY (CH)							1
		w/sandy clay pockets							1

Bottom @ 20'

HSRD = Head Space Reading

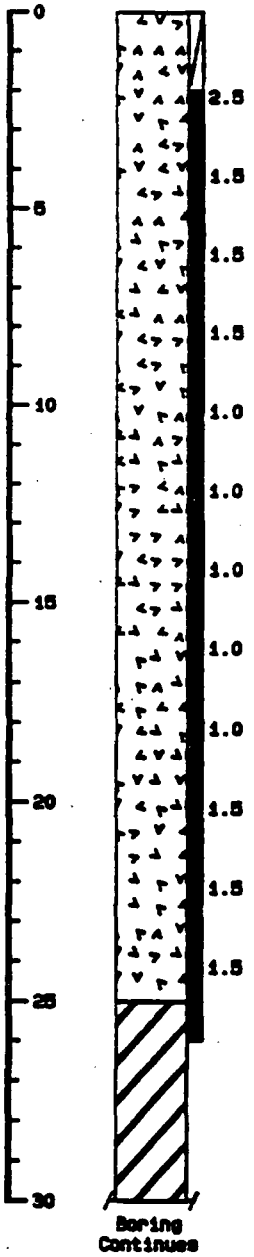
McBride-Ratcliff and Associates, Inc.

LOG OF BORING

Project : Commerce Street Environmental Site Assessment
Client : Parkway Detention Houston, Texas

Boring No. : CB-7
File No. : 88-105
Date : 4-2-88
Elevation : - ft.

Dry Augered 0 to 32 ft. Water at feet; Caving at ft.
Wash Bored to ft. Water at ft. after



Description	Mc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm.
Medium dark gray CLAY (CH) "FILL"							
-petroleum odor below 2' -sandy clay pockets 2'-4'							10
							4
-intermixed gravel & sand pockets below 6'							5
							6
							19
							8
							6
							8
-tan & light gray sandy clay below 19'							4
							4
							2
Very stiff tan & gray CLAY (CH)							2

Bottom @ 32'

HSRD = Head Space Reading

McBride-Ratcliff and Associates, Inc.

LOG OF BORING

Project : Commerce Street Environmental
Site Assessment
Client : Parkway Detention
Houston, Texas

Boring No. : CB-7
File No. : 88-105
Date : 4-2-88
Elevation : - ft

Dry Augered 0 to 32 ft. Water at feet; Caving at ft
Wash Bored to ft. Water at ft. after

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm.
30	3.8	Very stiff tan & gray CLAY (CH) -tan, reddish brown, & gray below 30'							2

Bottom @ 32'

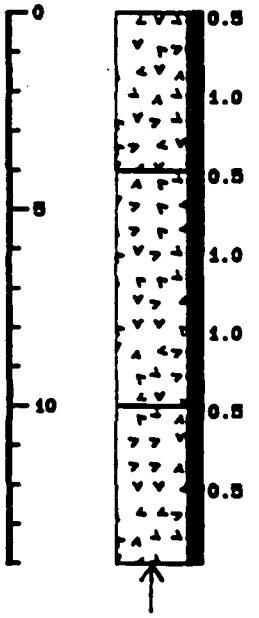
HSRD = Head Space Reading

LOG OF BORING

Project : Commerce Street Environmental
Site Assessment
Client : Parkway Detention
Houston, Texas

Boring No. : CB-8
File No. : 88-105
Date : 4-2-88
Elevation : - ft.

Dry Augered 0 to 14 ft. Water at feet; Caving at ft.
Wash Bored to ft. Water at ft. after



ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Mc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm.
		Medium dark gray CLAY (CH) "FILL" -w/sandy clay pockets & gravel							1
									1
		Medium tan, light gray, & dark gray SANDY CLAY (CL) "FILL" w/calcareous nodules -petroleum odor below 6'							1
									1
									3
		Soft dark gray & tan CLAY (CH) "FILL" w/gravel & petroleum odor							1
		-underground obstruction 14'							3

Bottom @ 14'

HSRD = Head Space Reading

LOG OF BORING

Project : Commerce Street Environmental Site Assessment
Client : Parkway Detention Houston, Texas

Boring No. : CB-9
File No. : 88-105
Date : 4-2-88
Elevation : - ft

Dry Augered 0 to 32 ft. Water at feet: Caving at ft
Wash Bored to ft. Water at ft. after

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Mc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSR ppm
0	0.5	Soft dark gray & light gray CLAY (CH) "FILL" w/gravel & sand layers							2
	0.5								1
	0.5								1
5	0.5								1
	1.0	-medium below 8'							0
10	1.0								0
	1.5	Medium SANDY CLAY (CL) "FILL" w/gravel & sand layers							0
	1.5	-petroleum odor below 14'							4
15	1.0								2
	1.0								3
20	1.0								4
	0.5								6
25									
		Medium tan & light gray SILTY SAND (SM) w/petroleum odor							8
30	Boring Continues								11

Bottom @ 32'

HSRD = Head Space Reading

McBride-Ratcliff and Associates, Inc.

LOG OF BORING

Project : Commerce Street Environmental
Site Assessment
Client : Parkway Detention
Houston, Texas

Boring No. : CB-9
File No. : 88-105
Date : 4-2-88
Elevation : - ft.

Dry Augered 0 to 32 ft. Water at feet; Caving at ft.
Wash Bored to ft. Water at ft. after

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Mc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm.
30	10/6 12/6 17/6	Medium tan & light gray SILTY SAND (SM) w/petroleum odor							12

Bottom @ 32'

HSRD = Head Space Reading

McBride-Ratcliff and Associates, Inc.

LOG OF BORING

Project : Commerce Street Environmental
Site Assessment
Client : Parkway Detention
Houston, Texas

Boring No. : CB-11
File No. : 88-105
Date : 4-2-88
Elevation : - ft.

Dry Augered 0 to 14 ft. Water at feet; Caving at ft.
Wash Bored to ft. Water at ft. after

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	HSRD ppm.
0	1.0	Stiff tan, reddish brown & gray CLAY (CH) "FILL" w/sand seams & clay pockets							2
	1.0	-medium to 4'							2
	3.0								1
5	2.5								1
	1.5	-petroleum odor 8'-10'							3
10	3.0	-intermixed gravel below 12'							
		-underground obstruction 14'							3

Bottom @ 14'

HSRD = Head Space Reading

APPENDIX B

PREVIOUS SOIL BORING LOGS

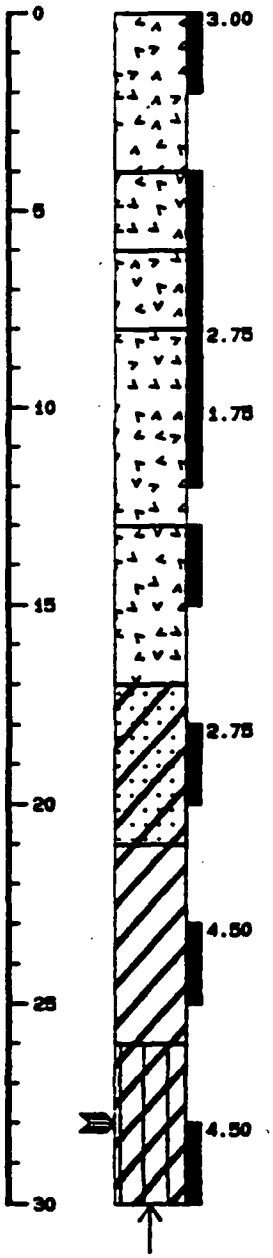
LOG OF BORING

Project : Commerce Street Tract

Boring No. : CB-1
File No. : 88-084
Date : 2-27-88
Elevation : - ft

Client : Parkway Detention
Houston, Texas

Dry Augered 0 to 30 ft. Water at ft.; Caving at ft
Wash Bored to ft. Water at 28.0 ft. after 5 hours



ELEV / DEPTH	Description	Mc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	#200 (%)
0	1" Asphalt + 4" Limestone base Very stiff gray & dark gray CLAY (CH) "FILL" -wood debris @ 2'-4'							
5	Firm gray SAND (SP) "FILL" -w/odors @ 4'							
	Firm brown CLAYEY SAND (SC) "FILL" -w/odors @ 6'							
10	Very stiff black & dark gray CLAY (CH) "FILL" -w/odors @ 8'							
15	Firm gray CLAYEY SAND (SC) "FILL" -w/wood debris & odors @ 13'							
20	Very stiff gray & tan SANDY CLAY (CL) w/sand pockets & odors							
25	Hard red & gray CLAY (CH) w/calcareous nodules & claystones							
30	Hard red & gray SILTY CLAY (CL) w/clay layers, silt pockets & seams							

Bottom @ 30'

LOG OF BORING

Project : Commerce Street Tract

Boring No. : CB-2
File No. : 88-084

Client : Parkway Detention
Houston, Texas

Date : 2-27-88
Elevation : - ft.

Dry Augered 0 to 25 ft. Water at ft.: Caving at ft.
Wash Bored 25 to 80 ft. Water at ft. after

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	#200 (%)
0	1.25	Stiff dark gray CLAY (CH) "FILL"							
	1.00	-w/rocks, concrete debris, bricks, tan @ 4'							
5		-dark gray @ 6'							
		Very stiff red & gray SANDY CLAY (CL) "FILL"							
10		-w/sand pockets @ 8'							
	0.75	Medium dark gray CLAY (CH) "FILL"							
15		-w/large pieces of concrete @ 13'							
	0.75	Medium brown SANDY CLAY (CL) "FILL"							
20		-w/bricks & gravel @ 18'							
		Loose tan CLAYEY SAND (SC)							
25									
		Firm reddish tan SILTY SAND (SM)							
30	18/12								

Boring Continues

LOG OF BORING

Project : Commerce Street Tract

Client : Parkway Detention
Houston, Texas

Boring No. : CB-2
File No. : 88-084
Date : 2-27-88
Elevation : - ft.

Dry Augered 0 to 25 ft. Water at ft.; Caving at ft.
Wash Bored 25 to 80 ft. Water at ft. after

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	#200 (%)
30	15/12	Firm reddish tan SILTY SAND (SM)							
		-brown w/odors @ 33'							
35	20/12	Firm brown CLAYEY SAND (SC) w/faint odors							
40	18/12								
45	48/12	-dense, red @ 46'							
50	33/12	Very stiff red SILTY CLAY (CL)							
	4.00	Very stiff red CLAY (CH)							
55		-becoming silty @ 56'							
		Very dense red SILTY SAND (SM)							
60	71/12								

Boring Continues

LOG OF BORING

Project : Commerce Street Tract

Client : Parkway Detention
Houston, Texas

Boring No. : CB-2
File No. : 88-084
Date : 2-27-88
Elevation : - ft

Dry Augered 0 to 25 ft. Water at ft.; Caving at ft
Wash Bored 25 to 80 ft. Water at ft. after

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	Description	Wc (%)	Dens. (pcf)	Qu or UU (tsf)	Str (%)	LL	PI	#200 (%)
60		Very stiff red SILTY CLAY (CL)							
65		Dense red CLAYEY SILT (ML)							
		Very stiff tan CLAY (CH)							
	4.00	Very stiff red SILTY CLAY (CL) w/silt laminations							
70		Hard tan SANDY CLAY (CL)							
	4.50	Hard brown & gray CLAY (CH) w/calcareous nodules							
75									
	4.50								
80									

Bottom @ 80'

LOG OF BORING

PROJECT: Slope Protection Study
Elysian Street Bridge Improvements
Houston, Texas

CLIENT: Robert Reid Consulting Engineer, Inc.
Houston, Texas

BORING NO. CB-2
FILE NO. 86-001
DATE 11-19-86

DRY AUGERED 0 TO 25 FEET
WASH BORED 25 TO 70 FEET

FREE WATER ENCOUNTERED YES NO

AT ** FT. DEPTH.

WATER AT FT. AFTER
**boring walls collapsed @ 25'

SOIL SYMBOL	DEPTH (feet)	SAMPLES	Penetration Resistance (N) or TSF	Moisture Content %	Dry Density, PCF	Compressive Strength TSF	Failure Strain %	ATTERBERG LIMITS Liquid LL	Plastic PL	Plasticity Index PI	Minus No. 200 Sieve - %	DESCRIPTION OF STRATUM
			4.00	15								Very stiff tan & dark gray CLAY -w/sand pockets, shell, limestone & roots @ 0-2'
			3.25	19								-stiff w/shell & gravel @ 4'
	5		2.75	18								-w/calcareous nodules @ 6'
			2.00	18								
			2.25	18								
	10											
			2.75	27								Stiff tan & gray SILTY CLAY w/strong gasoline odor -w/clay layers & ferrous nodules @ 13'
	15											-medium, w/abundant calcareous nodules @ 18'
			1.75	22	102	0.79	8					
	20											
			2.50	28								-stiff, very silty, light gray & tan w/clay layers & ferrous nodules @ 23'
	25											
			N=11									Firm GRAVEL w/oil coating
	30											"FILL"
			3.00	23	105	2.87	4	65	26	39		Very stiff red CLAY (CH) w/slickensides, siltstones & silt pockets
	35											
			3.25	25								Firm gray & reddish brown CLAYEY SILT (ML) w/siltstones
	40											

* SLICKENSIDED FAILURE
( ) CONFINING PRESSURE, PSI
G.S. GRAIN SIZE

PENETRATION RESISTANCE
(N) - STANDARD PENETRATION RESISTANCE (SPT)
TSF - POCKET PENETROMETER OR TORVANE ESTIMATED UNCONFINED COMPRESSIVE STRENGTH, TONS PER SQ. FOOT

McBride-Ratcliff and Associates, Inc.

LOG OF BORING

PROJECT: Slope Protection Study
Elysian Street Bridge Improvements
Houston, Texas

CLIENT: Robert Reid Consulting Engineer, Inc.
Houston, Texas

BORING NO. CB-2
FILE NO. 86-001
DATE 11-19-86

DRY AUGERED 0 TO 25 FEET
WASH BORED 25 TO 70 FEET

FREE WATER ENCOUNTERED YES NO

AT ** FT. DEPTH.

WATER AT FT. AFTER
**boring walls collapsed @ 25'

SOIL SYMBOL	DEPTH (feet)	SAMPLES	Penetration Resistance (N) or TSF	Moisture Content %	Dry Density, PCF	Compressive Strength TSF	Failure Strain %	ATTERBERG LIMITS: Liquid LL	Plastic PL	Plasticity Index PI	Minus No. 200 Sieve - %	DESCRIPTION OF STRATUM
												Firm gray & reddish brown CLAYEY SILT (ML) w/siltstones -red @ 42'
	45		N=23	23								Very stiff reddish brown SILTY CLAY (CL) w/gasoline odor
	50		N=48								80	Dense tan & red SANDY SILT (ML) w/clay seams & partings -w/siltstones @ 52'
	55		4.5+	26								Hard reddish brown CLAY (CH) w/calcareous nodules
	60		4.5+	19								Very dense reddish brown CLAYEY SILT (ML) w/clay pockets -w/silt layer @ 59.5'
	65		N=47								35	Dense tan & gray VERY SILTY SAND (SM) w/clay partings
	70		4.5+	30								Hard reddish brown CLAY (CH) w/silt layers -w/sand seams & partings @ 69.5'
												Bottom @ 70'

* SLICKENSIDED FAILURE
( ) CONFINING PRESSURE, PSI
G.S. GRAIN SIZE

PENETRATION RESISTANCE
(N) - STANDARD PENETRATION RESISTANCE (SPT)
TSF - POCKET PENETROMETER OR TORVANE ESTIMATED UNCONFINED COMPRESSIVE STRENGTH, TONS PER SQ. FOOT

SYMBOLS AND TERMS USED ON BORING LOGS

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	
				GP	
		GRAVELS WITH FINES		GM	
				GC	
	SAND AND SANDY SOILS	CLEAN SANDS		SW	
				SP	
		SANDS WITH FINES		SM	
				SC	
FINE GRAINED SOILS	SILTS AND CLAYS			ML	
				CL	
				OL	
	SILTS AND CLAYS			MH	
				CH	
				OH	
HIGHLY ORGANIC SOILS				PT	
NOT CLASSIFIED BY UNIFIED SYSTEM					

SOIL CLASSIFICATION CHART

SAMPLE TYPES

INDICATES DEPTH OF UNDISTURBED SAMPLE

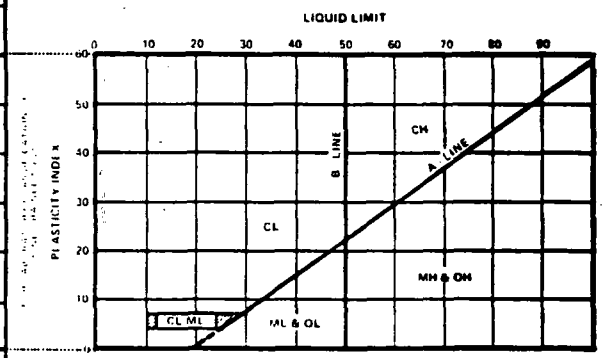
INDICATES DEPTH OF STANDARD PENETRATION TEST

INDICATES DEPTH OF DISTURBED OR AUGER SAMPLE

INDICATES DEPTH OF SAMPLING ATTEMPT WITH NO RECOVERY

KEY TO SAMPLES

(SHOWN IN SAMPLES COLUMN)



PLASTICITY CHART

UNIFIED SOIL CLASSIFICATION SYSTEM

RELATIVE DENSITY OF COHESIONLESS SOILS

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Conditions rated according to standard penetration test (SPT) as performed in the field.

Descriptive Term	Blows Per Foot*
Very Loose	0 - 4
Loose	5 - 10
Firm	11 - 30
Dense	31 - 50
Very Dense	over 50

*140 pound weight having a free fall of 30 inches.

CONSISTENCY OF COHESIVE SOILS

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength as indicated by penetrometer readings or by unconfined compression tests.

Descriptive Term	Unconfined Compressive Strength Ton/Sq. Ft.
Very Soft	Less than 0.25
Soft	0.25 to 0.50
Medium	0.50 to 1.00
Stiff	1.00 to 2.00
Very Stiff	2.00 to 4.00
Hard	4.00 and higher

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of weakness or cracks in the soil. The consistency ratings of such soils are based on penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided — having inclined planes of weakness that are slick and glossy in appearance.

Fissured — containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

Laminated — composed of thin layers of varying color and texture.

Interbedded — composed of alternate layers of different soil types.

Calcareous — containing appreciable quantities of calcium carbonate.

Well graded — having wide range in grain sizes and substantial amounts of all intermediate particle sizes.

Poorly graded — predominantly of one grain size, or having a range of sizes with some intermediate size missing.

APPENDIX C

SOIL ANALYTICAL TEST RESULTS

M.B.A LABS

MICROBIOLOGICAL AND BIOCHEMICAL ASSAY

LABORATORIES

88-105 w/ Perk/PCB runs

P.O.BOX 9461
HOUSTON,TEXAS 77261

340 S.66 TH STREET
TEL (713) 928-2701

SAMPLE SUBMITTED BY:	McBRIDE-RATCLIFF
DATE RECEIVED:	3-17-88
DATE COMPLETED:	3-28-88
LABORATORY REPORT NUMBER:	J-11526-11530
SAMPLE IDENTIFICATION:	COMP#2,COMP#4,COMP#5A COMP#5B AND COMP#56C

THE SAMPLES WERE ANALYZED BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY USING HEWLETT-PACKARD MODEL # 5970 GC/MS SYSTEMS.

THE SAMPLES WERE PREPARED FOR ANALYSIS ACCORDING TO THE METHODS DESCRIBED IN:

40 CFR PART 136, FEDERAL REGISTER, FRIDAY, OCTOBER 26, 1984 ENVIRONMENTAL PROTECTION AGENCY, PART VIII.

2. ACID/BASE-NEUTRAL METHOD 625
3. EPA MIX PESTICIDES METHOD 625
4. PCB'S (BY G.C.)METHOD 608

THE SAMPLES WERE ANALYZED FOR THE FOLLOWING COMPOUNDS:

EPA MIX PESTICIDES
ACID/BASE-NEUTRAL EXTRACTABLES

Barbara Anderson

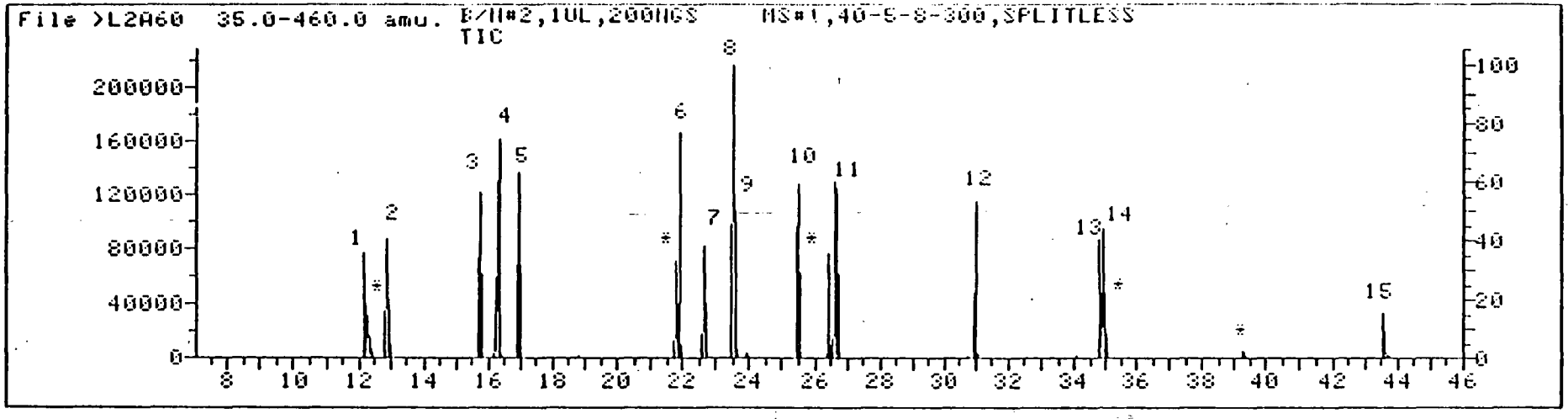
BASE NEUTRAL/ACID EXTRACTABLES

THE GC/MS PARAMETERS WERE AS FOLLOWS:

COLUMN	25 METER FUSED SILICA CAPILLARY COATED WITH SE-30
CARRIER GAS	HELIUM @ 30 CM/SEC(0.9 ML/MIN)
INJECTOR TEMP	270 DEGREES
COLUMN TEMP	5 MINUTES @ 40 DEGREES, THEN 8 DEGREES PER MINUTE TO 300 DEGREES, HOLD AT 300 DEGREES.
INJECTION MODE	SPLITLESS
SPLIT RATIO	----
GC/MS INTERFACE	DIRECT
IONIZATION MODE	ELECTRON IMPACT
ELECTRON ENERGY	70 V
MASS RANGE SCAN	35 TO 460 AMU
SCAN TIME	0.4 SEC

COPIES OF THE TOTAL ION CHROMATOGRAMS ARE INCLUDED WITH THIS REPORT. ALL GC/MS DATA IS PERMANENTLY STORED AT MBA LABORATORIES ON MAGNETIC MEDIA.

Ben Hoscanian

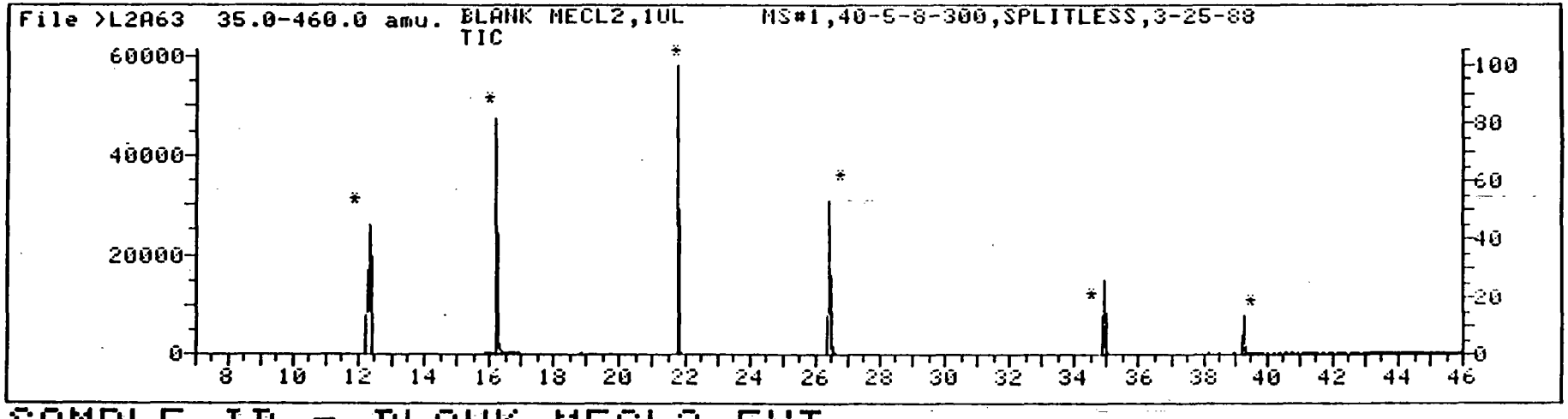


SAMPLE ID = BASE/NEUTRAL #2

1- 1,3-DICHLOROBENZENE
2- 1,2-DICHLOROBENZENE
3- BIS(2-CHLOROETHOXY) METHANE
4- NAPHTHALENE
5- HEXACHLOROBUTADIENE
6- ACENAPHTHENE
7- 2,4-DINITROTOLUENE
8- DIETHYL PHTHALATE
9- FLUORENE
10- HEXACHLOROBENZENE
11- ANTHRACENE
12- FLUORANTHENE
13- CHRYSENE
14- BENZO(A)ANTHRACENE
15- DIBENZO(A,H)ANTHRACENE

*THESE ARE INTERNAL STANDARDS.

Ben Hancock



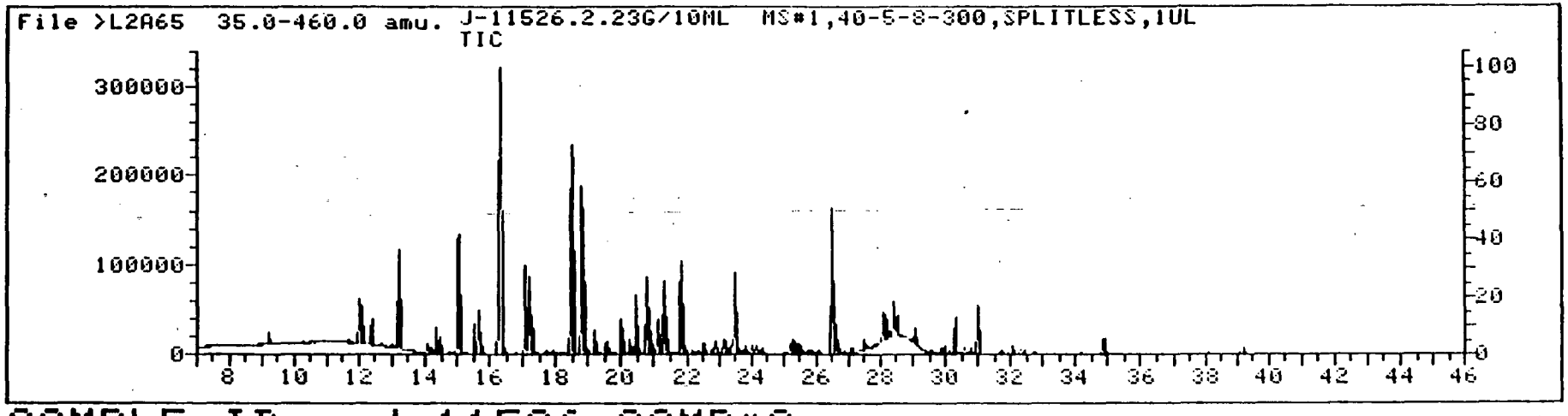
SAMPLE ID = BLANK MECL2 EXT.

RESUTLS

1- BNA'S (P.P)	NOT FOUND	<1	MG/KG

*THESE ARE INTERNAL STANDARDS.

Ben Hassanein

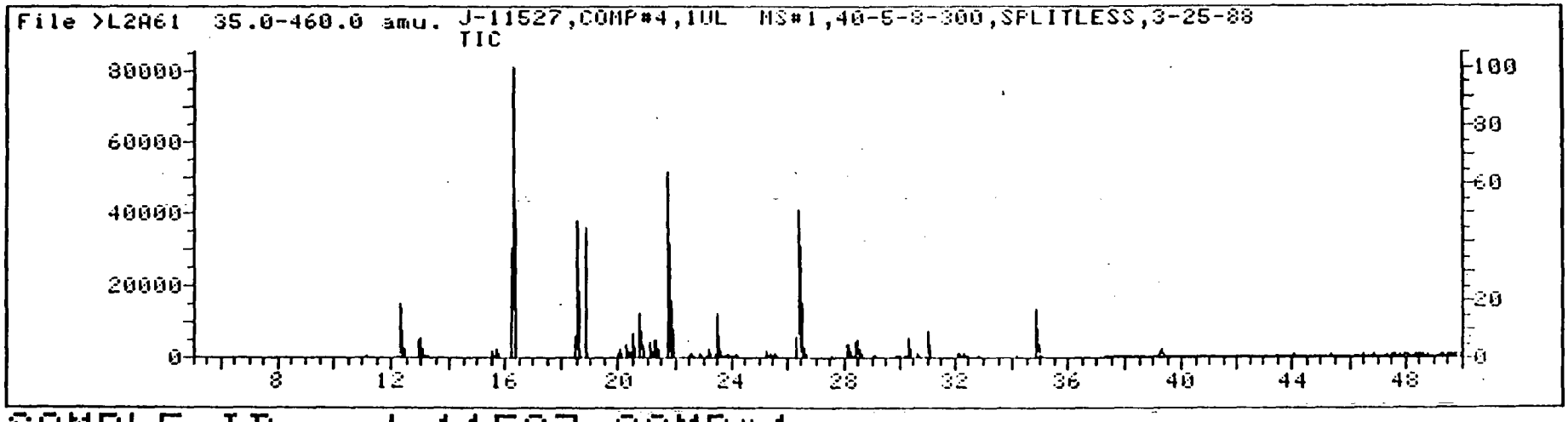


SAMPLE ID = J-11526,COMP#2

RESULTS

1-	BENZO(A)PYRENE	39.0	MINS	43	MG/KG
2-	NAPHTHALENE	16.3	MINS	2661	MG/KG
3-	ACENAPHTHYLENE	21.2	MINS	663	MG/KG
4-	ACENAPTHENE	21.8	MINS	144	MG/KG
5-	FLUORENE	23.4	MINS	526	MG/KG
6-	PHENANTHERENE	26.5	MINS	940	MG/KG
7-	ANTHRACENE	26.6	MINS	166	MG/KG
8-	FLUORANTHENE	30.2	MINS	253	MG/KG
9-	PYRENE	30.9	MINS	337	MG/KG
10-	CHRYSENE	34.9	MINS	105	MG/KG
11-	BENZO(A)ANTHRACENE	35.0	MINS	110	MG/KG
12-	BENZO(B)FLUORANTHENE	38.1	MINS	86	MG/KG
13-	INDENO(1,2,3,-CD)PYRENE	43.5	MINS	16	MG/KG
14-	BENZO(G.H.I)PERYLENE	44.7	MINS	16	MG/KG

Ben Hueonan

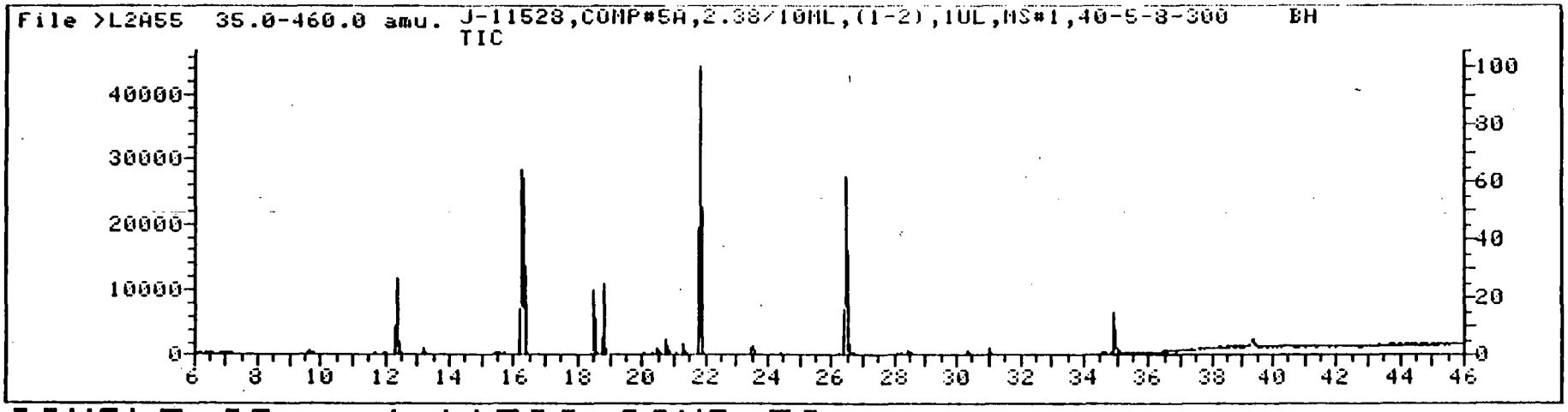


SAMPLE ID = J-11527,COMP#4

RESULTS

1-	NAPHTHALENE	16.2	MINS	4235	MG/KG
2-	ACENAPHTHYLENE	21.2	MINS	971	MG/KG
3-	ACENAPHTHENE	21.8	MINS	1187	MG/KG
4-	FLUORENE	23.5	MINS	977	MG/KG
5-	PHENANTHRENE	26.5	MINS	1838	MG/KG
6-	ANTHRACENE	26.6	MINS	1218	MG/KG
7-	FLUORANTHENE	30.2	MINS	492	MG/KG
8-	PYRENE	30.9	MINS	727	MG/KG
9-	CHRYSENE	34.8	MINS	185	MG/KG
10-	BENZ(A)ANTHRACENE	34.9	MINS	246	MG/KG
11-	BENZO(B)FLUORANTENE	38.1	MINS	318	MG/KG
12-	OTHER BNA'S(P.P)	NOT	FOUND	<5	MG/KG

Ben Hausman

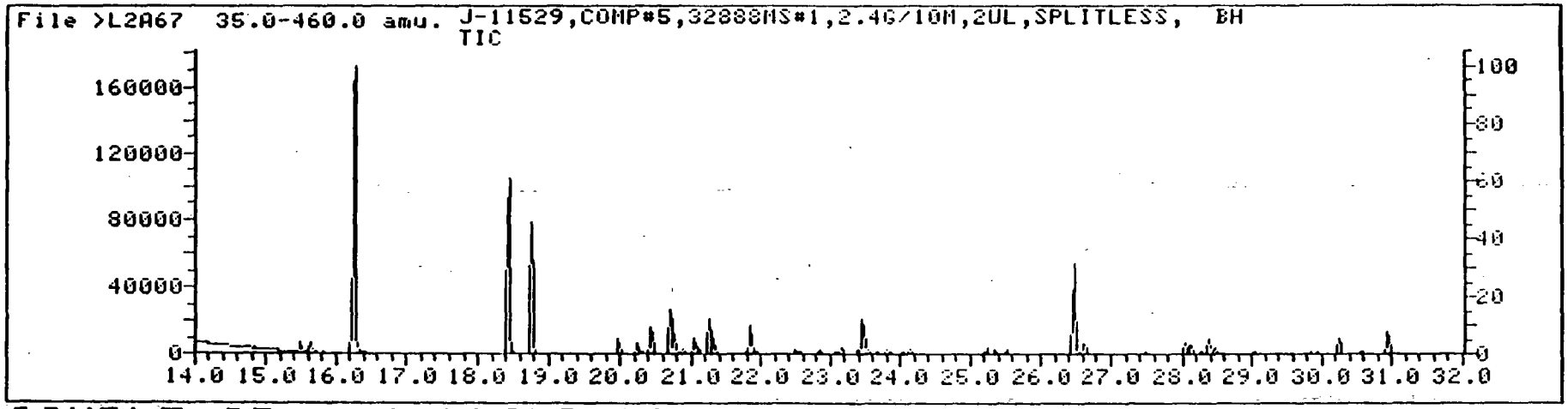


SAMPLE ID = J-11528,COMP#5A

RESULTS

1-	NAPHTHALENE	16.3	MINS	665	MG/KG
3-	ACENAPHTHYLENE	21.2	MINS	61	MG/KG
4-	ACENAPTHENE	21.8	MINS	24	MG/KG
5-	FLUORENE	23.4	MINS	163	MG/KG
6-	PHENANTHERENE	26.5	MINS	50	MG/KG
7-	ANTHRACENE	26.6	MINS	34	MG/KG
8-	FLUORANTHENE	30.2	MINS	34	MG/KG
9-	PYRENE	30.9	MINS	34	MG/KG
10-	CHRYSENE	34.9	MINS	50	MG/KG
11-	BENZO(A)ANTHRACENE	35.0	MINS	20	MG/KG
12-	OTHER BNA'S(P.P)	NOT	FOUND	<10	MG/KG

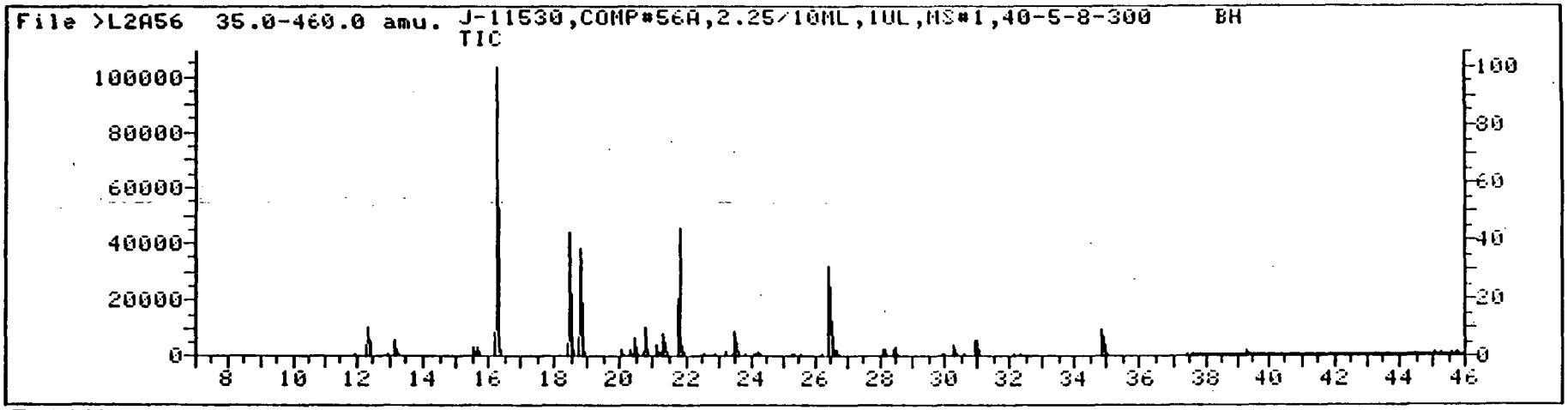
Ben Hassanian



SAMPLE ID = J-11529,COMP#5B

RESULTS

1-	NAPHTHALENE	16.3	MINS	435	MG/KG
2-	ACENAPHTHYLENE	21.2	MINS	28	MG/KG
3-	ACENAPTHENE	21.8	MINS	31	MG/KG
4-	FLUORENE	23.4	MINS	60	MG/KG
5-	PHENANTHERENE	26.5	MINS	123	MG/KG
6-	ANTHRACENE	26.6	MINS	24	MG/KG
7-	FLUORANTHENE	30.2	MINS	30	MG/KG
8-	PYRENE	30.9	MINS	44	MG/KG
9-	CHRYSENE	34.9	MINS	7	MG/KG
10-	BENZO(A)ANTHRACENE	35.0	MINS	11	MG/KG
11-	OTHER BNA'S(P.P)	NOT	FOUND	<1	MG/KG



SAMPLE ID = J-11530,COMP#56C

RESULTS

1-	NAPHTHALENE	16.3	MINS	2026	MG/KG
3-	ACENAPHTHYLENE	21.3	MINS	205	MG/KG
4-	ACENAPTHENE	21.9	MINS	87	MG/KG
5-	FLUORENE	23.5	MINS	185	MG/KG
6-	PHENANTHERENE	26.5	MINS	58	MG/KG
7-	ANTHRACENE	26.6	MINS	128	MG/KG
8-	FLUORANTHENE	30.2	MINS	136	MG/KG
9-	PYRENE	30.9	MINS	209	MG/KG
10-	CHRYSENE	34.9	MINS	93	MG/KG
11-	BENZO(A)ANTHRACENE	35.0	MINS	76	MG/KG
12-	BENZO)B)FLUORANTHENE	38.1	MINS	7	MG/KG
13-	OTHER BNA'S(P.P)	NOT	FOUND	<5	MG/KG

Ben Hanamian

METHOD FILE LIST

Method file: PEST04 GC type: 5890 Run Type: SIM, GC, EI
Column: Cap Splitless: Yes

Temperature:	Inj.P	Intfc	Source
	270.0	280.0	0.0

GC/DIP		LEVEL A	LEVEL B	POST RUN
Temp 1	150.0	280.0	0.0	0.0
Time 1	4.0	3.0	0.0	0.0
Rate	8.0	0.0	0.0	
Temp 2	280.0	0.0	0.0	
Time 2	3.0	0.0	0.0	

Oven equilibration Time 0.00 min

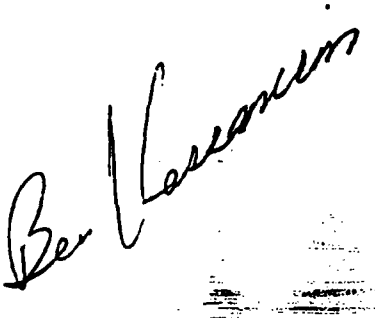
Run time: 23.00
Scan Start time: 10.00
Splitless valve time: 1.00

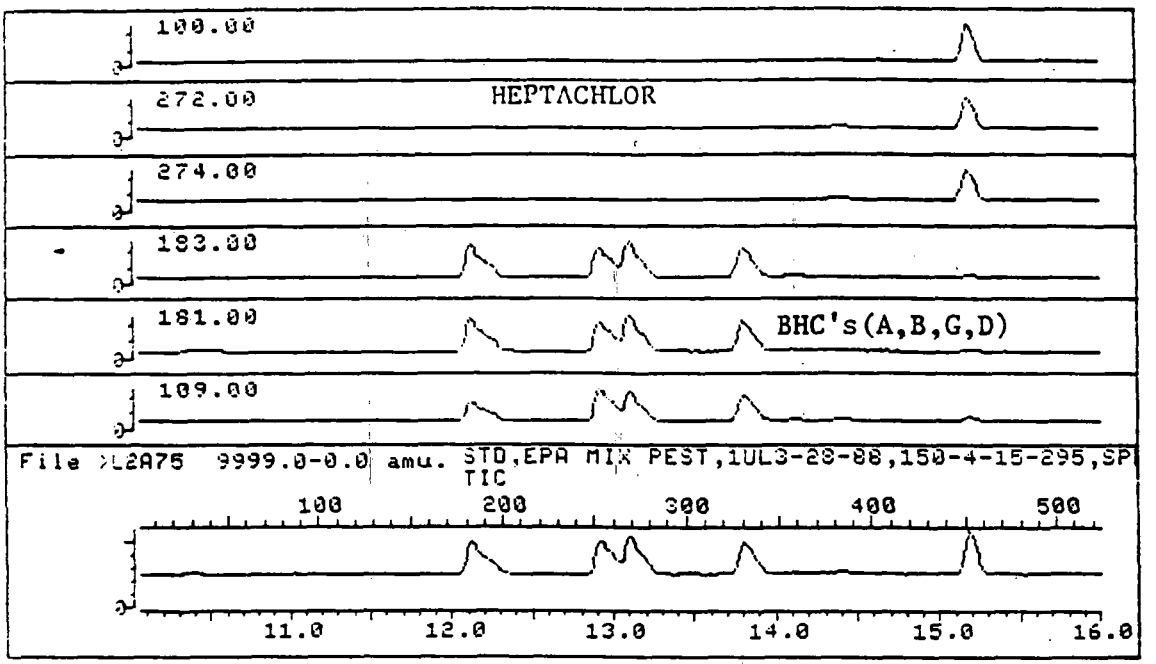
	ON	OFF	ON	OFF
Relay #1:	327.0	327.0	327.0	327.0
Relay #2:	327.0	327.0	327.0	327.0
Triac #0:	327.0	327.0	327.0	327.0
Triac #1:	327.0	327.0	327.0	327.0

Sim Parameters: Number of groups: 2

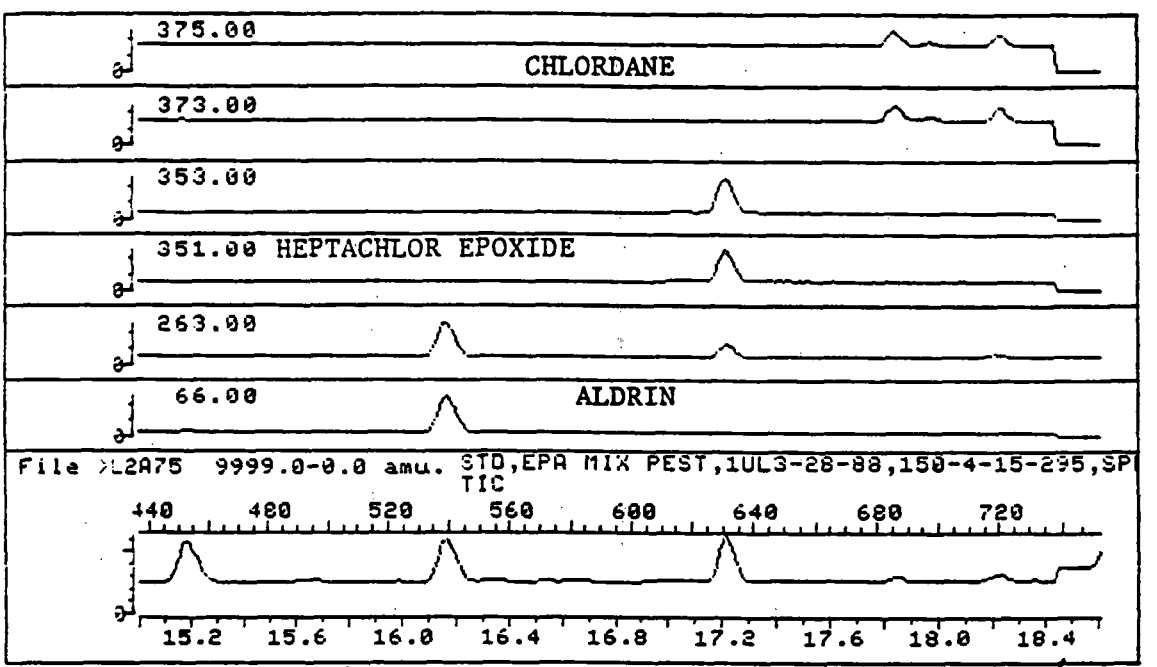
Multiplier voltage: 2300

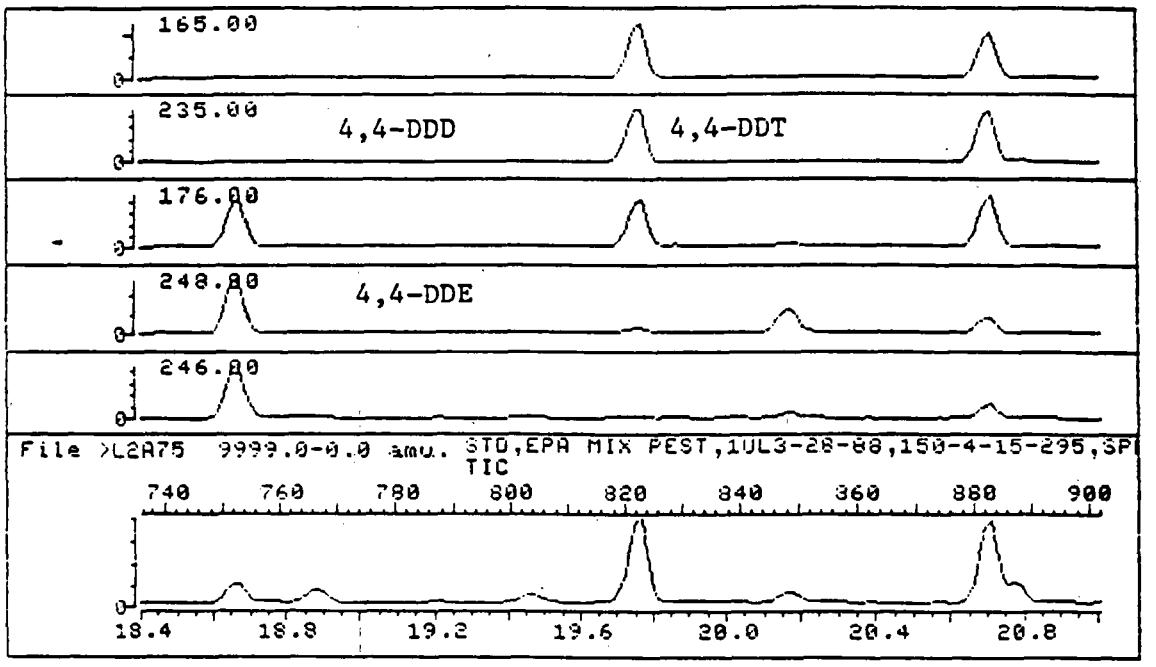
Group 1		Group 2		Group 3		Group 4		Group 5	
Start/Stop		Start/Stop		Start/Stop		Start/Stop		Start/Stop	
10.00	18.40	18.40	23.00	0.00	0.00	0.00	0.00	0.00	0.00
M/Z	Dwell	M/Z	Dwell	M/Z	Dwell	M/Z	Dwell	M/Z	Dwell
-66.0	50	-79.0	50	0.0	0	0.0	0	0.0	0
100.0	50	159.0	50	0.0	0	0.0	0	0.0	0
109.0	50	165.0	50	0.0	0	0.0	0	0.0	0
181.0	50	176.0	50	0.0	0	0.0	0	0.0	0
183.0	50	195.0	50	0.0	0	0.0	0	0.0	0
263.0	50	201.0	50	0.0	0	0.0	0	0.0	0
272.0	50	235.0	50	0.0	0	0.0	0	0.0	0
274.0	50	246.0	50	0.0	0	0.0	0	0.0	0
351.0	50	248.0	50	0.0	0	0.0	0	0.0	0
-353.0	50	261.0	50	0.0	0	0.0	0	0.0	0
355.0	50	-263.0	50	0.0	0	0.0	0	0.0	0
373.0	50	272.0	50	0.0	0	0.0	0	0.0	0
-375.0	50	278.0	50	0.0	0	0.0	0	0.0	0
0.0	0	279.0	50	0.0	0	0.0	0	0.0	0
0.0	0	283.0	50	0.0	0	0.0	0	0.0	0
0.0	0	293.0	50	0.0	0	0.0	0	0.0	0



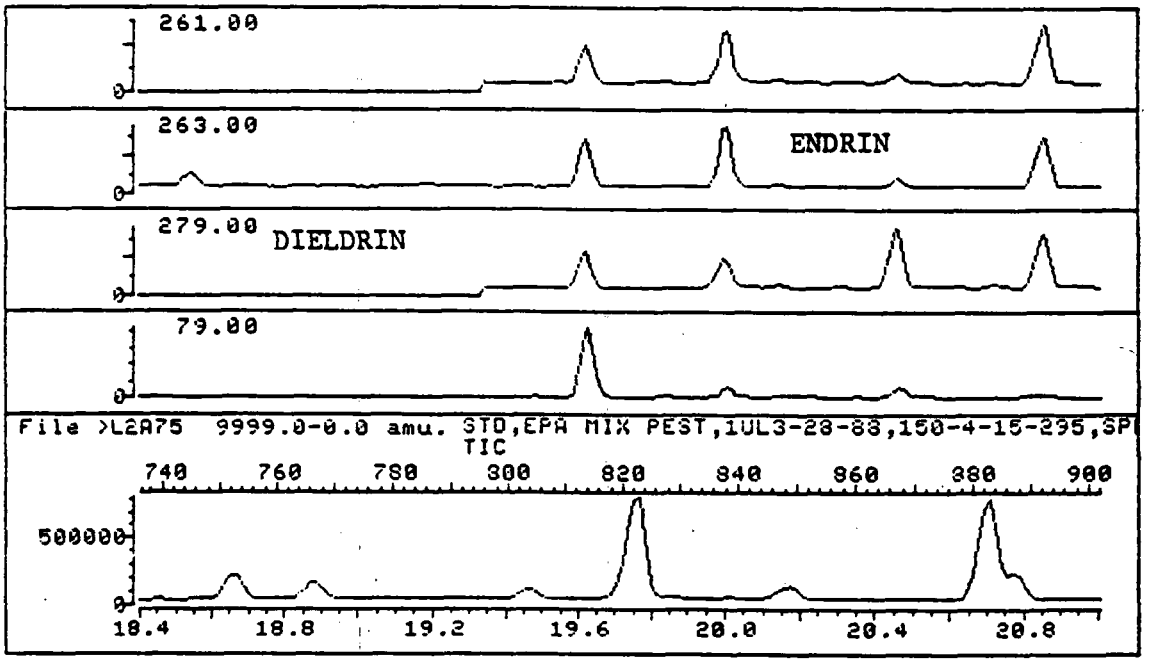


SAMPLE ID =EPA MIX PESTICIDES(pg-1)





SAMPLE ID =STANDARD EPA MIX PESTICIDES(pg-2)



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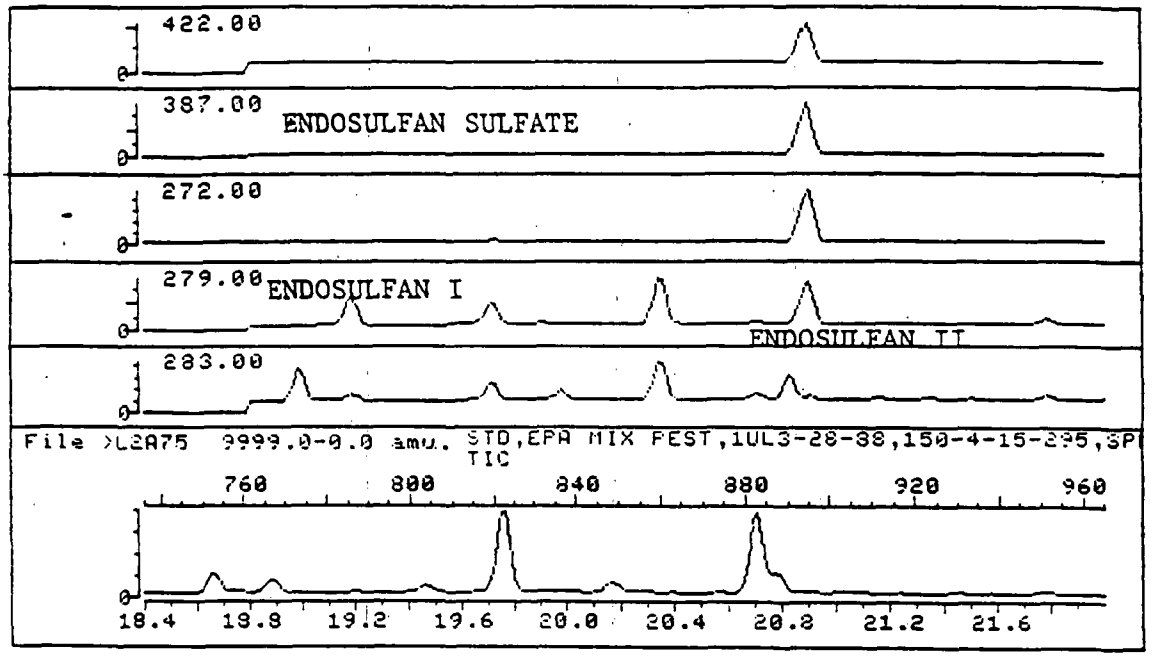
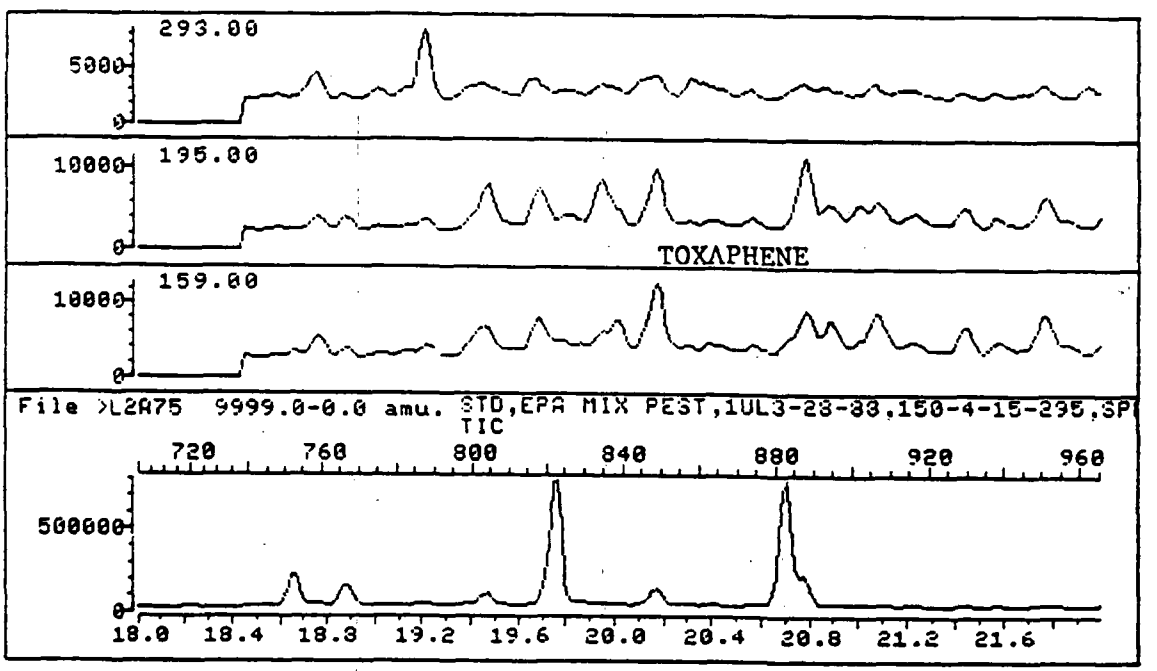


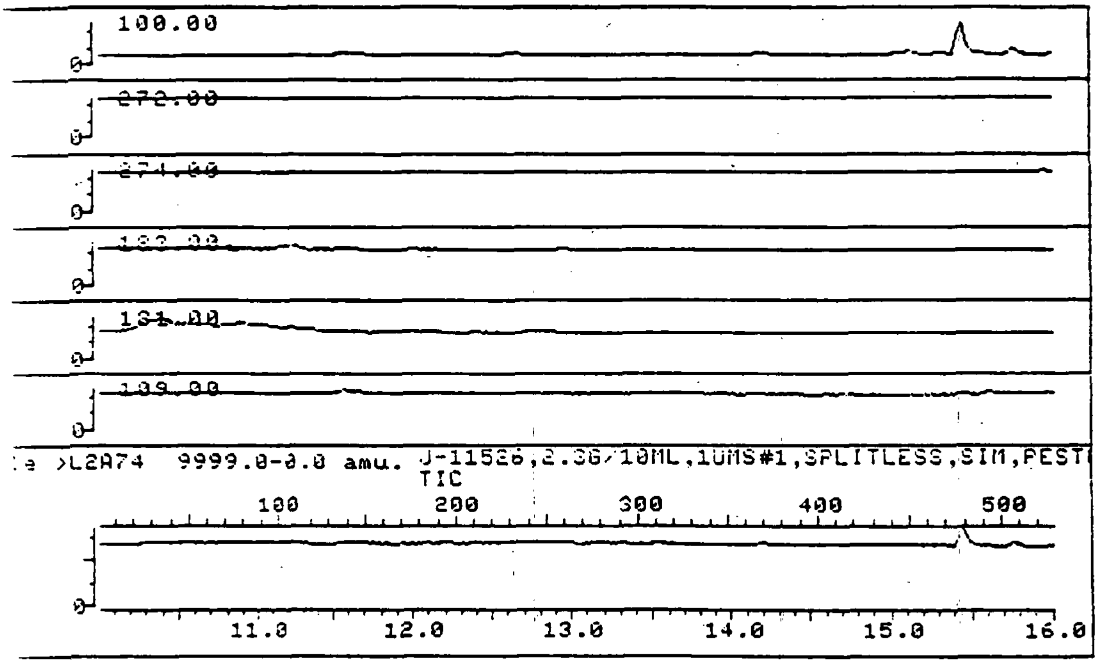
SAMPLE ID =STANDARD EPA MIX PESTICIDES(pg-3)

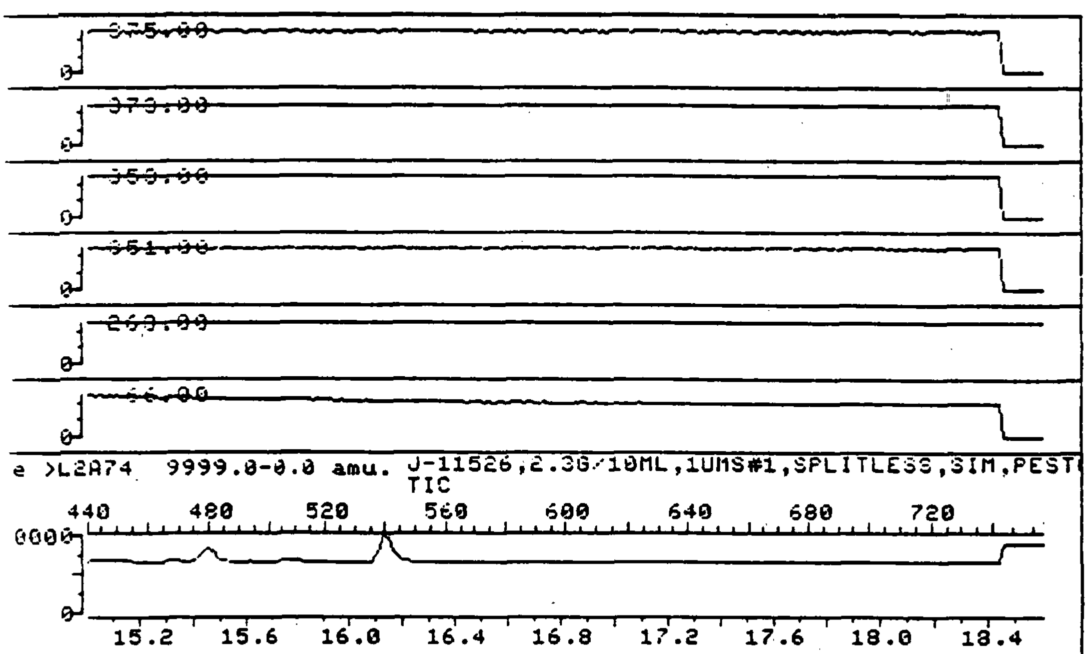


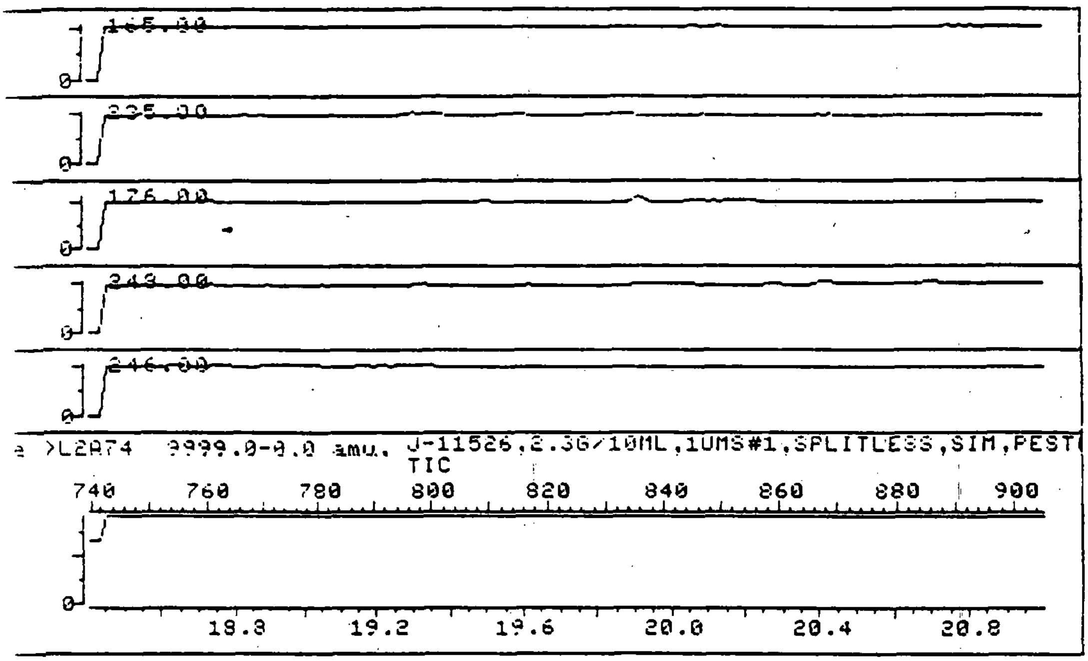
Sample I.D. J - 11526

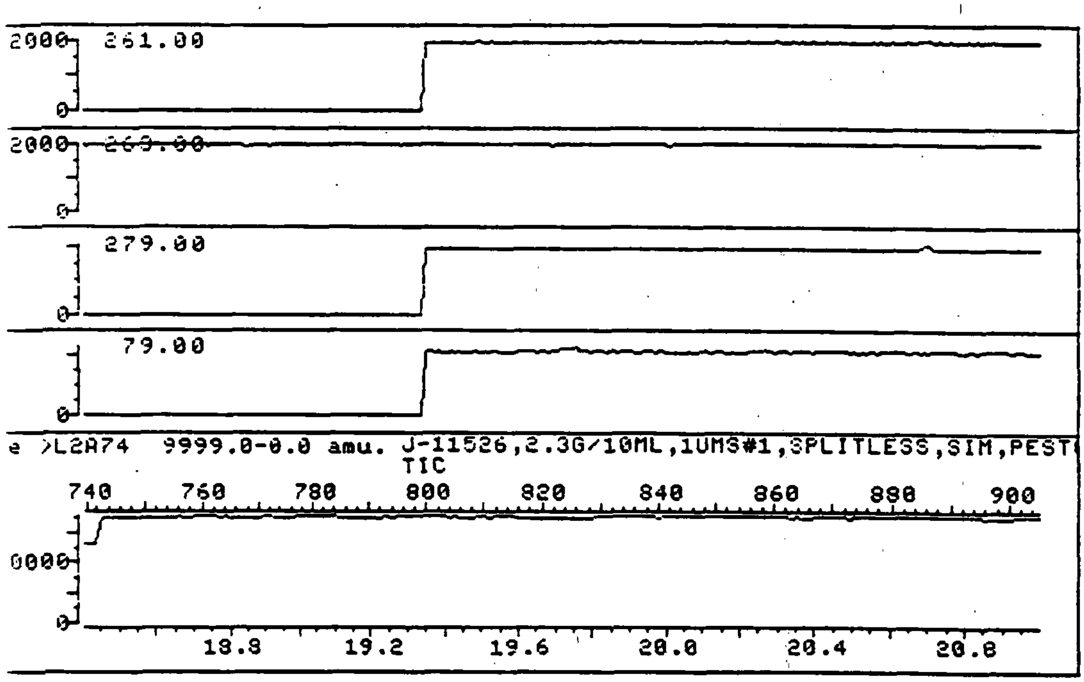
EPA MIX PESTICIDES
RESULTS

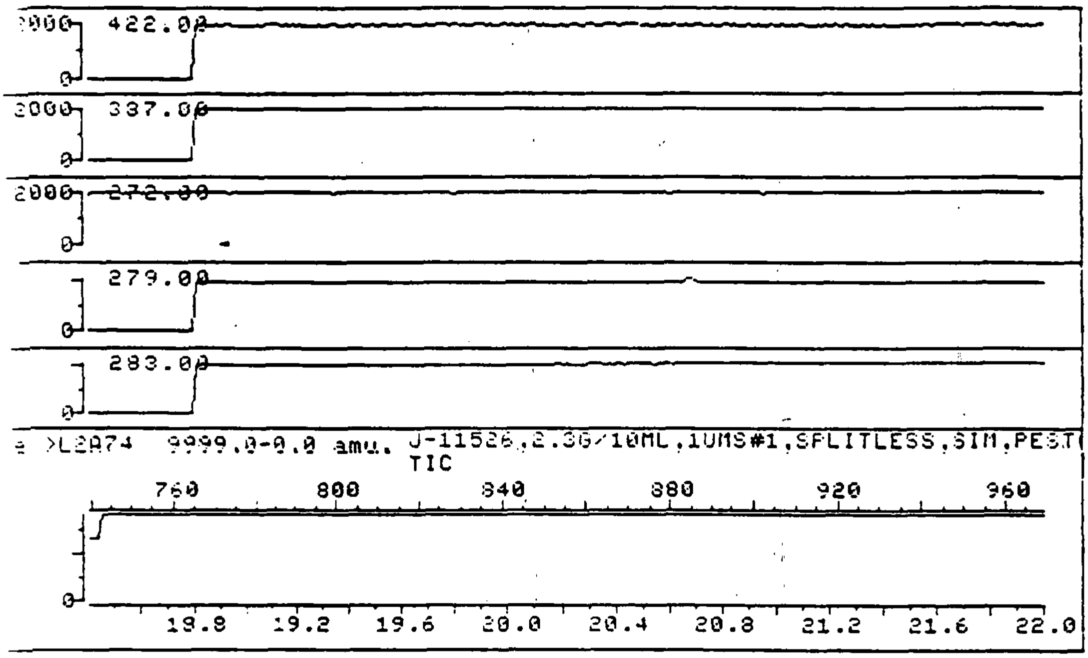
1 - BHC (a,b,g,d)	Not found	<0.5 mg/kg
2 - Heptachlor	Not found	<0.5 mg/kg
3 - Heptachlor Epoxide	Not found	<0.5 mg/kg
4 - Aldrin	Not found	<0.5 mg/kg
5 - Endrin	Not found	<0.5 mg/kg
6 - Dieldrin	Not found	<0.5 mg/kg
7 - Endosulfan I	Not found	<0.5 mg/kg
8 - Endosulfan II	Not found	<0.5 mg/kg
9 - 4,4' - DDE	Not found	<0.5 mg/kg
10 - 4,4' - DDD	Not found	<0.5 mg/kg
11 - 4,4' - DDT	Not found	<0.5 mg/kg
12 - Chlordane	Not found	<0.5 mg/kg
13 - Toxaphene	Not found	<5.0 mg/kg
14 - PCB's (Archlor 1254)	By GC - HECD	0.001 mg/kg

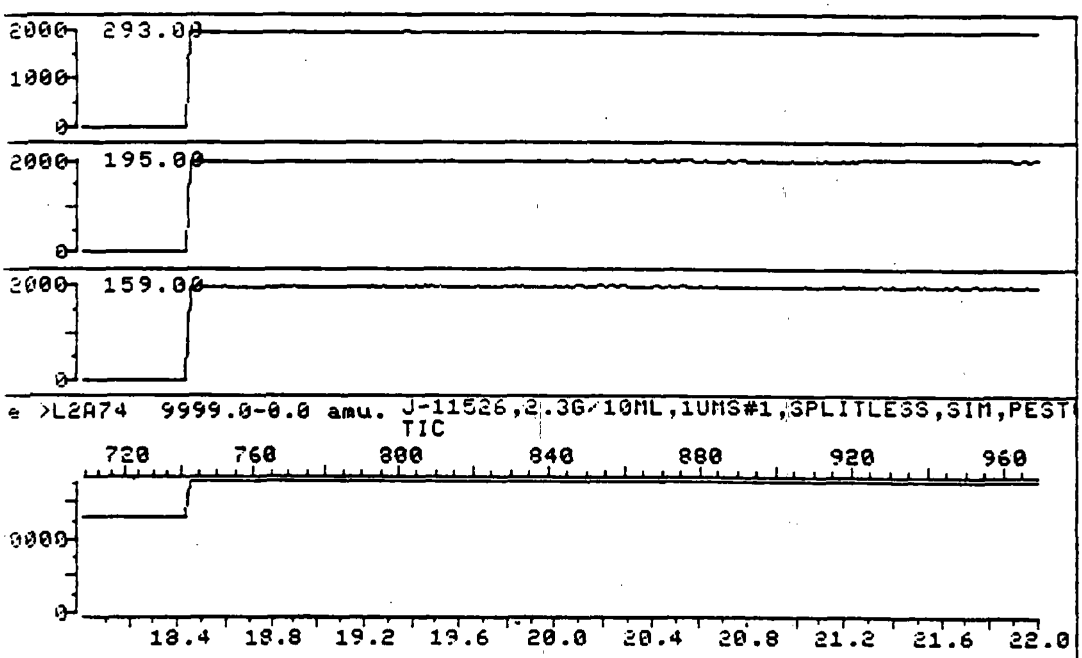

100.00
272.00
274.00
0
e >L2A74 9999.0-0.0 amu. J-11526,2.3G/10ML,1UMS#1,SPLITLESS,SIM,PEST
TIC
100
200
300
400
500
11.0
12.0
13.0
14.0
15.0
16.0


0
e >L2A74 9999.0-0.0 amu. J-11526,2.3G/10ML,1UMS#1,SPLITLESS,SIM,PEST
TIC
440
480
520
560
600
640
680
720
15.2
15.6
16.0
16.4
16.8
17.2
17.6
18.0
18.4


165.00
235.00
176.00
243.00
246.00
e >L2A74 9999.0-0.0 amu. J-11526,2.3G/10ML,1UMS#1,SPLITLESS,SIM,PEST
TIC
740 760 780 800 820 840 860 880 900
18.8 19.2 19.6 20.0 20.4 20.8

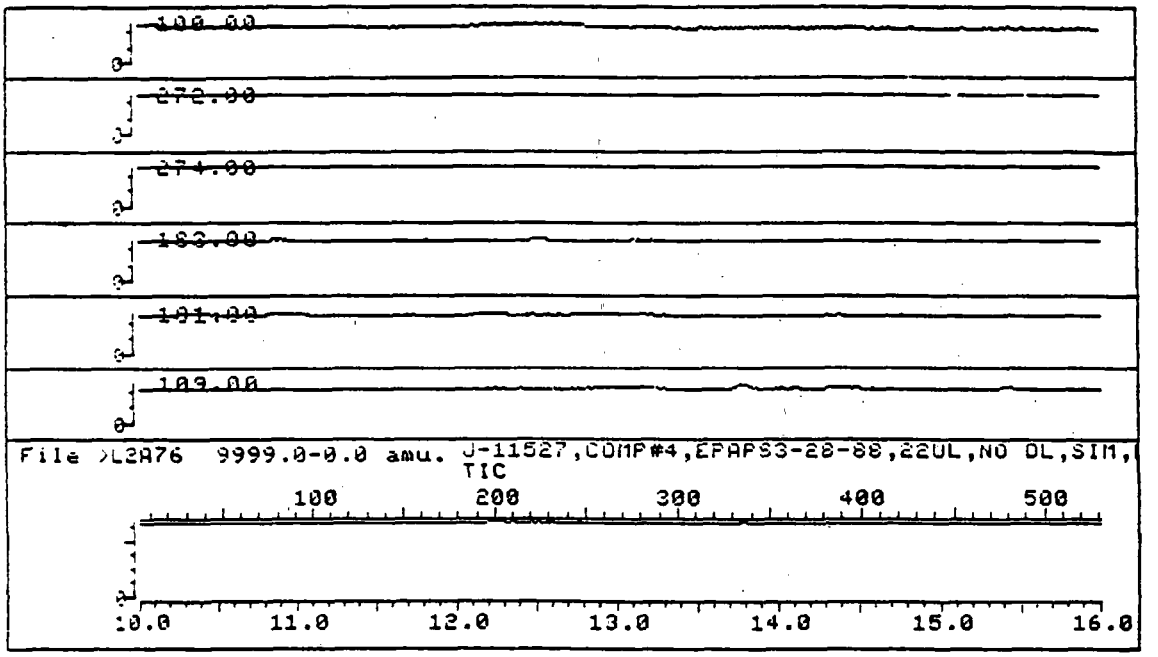

2000 261.00
2000 269.00
279.00
79.00
e >L2A74 9999.0-0.0 amu. J-11526,2.3G/10ML,1UMS#1,SPLITLESS,SIM,PEST
TIC
740 760 780 800 820 840 860 880 900
0000
18.8 19.2 19.6 20.0 20.4 20.8


422.00
337.00
272.00
279.00
283.00
e >L2A74 9999.0-0.0 amu. J-11526,2.3G/10ML,1UMS#1,SPLITLESS,SIM,PEST
TIC
760 800 840 880 920 960
18.8 19.2 19.6 20.0 20.4 20.8 21.2 21.6 22.0


2000
1000
293.00
195.00
159.00
e >L2A74 9999.0-0.0 amu. J-11526,2.3G/10ML,1UMS#1,SPLITLESS,SIM,PEST
TIC
720 760 800 840 880 920 960
18.4 18.8 19.2 19.6 20.0 20.4 20.8 21.2 21.6 22.0

EPA MIX PESTICIDES
RESULTS

1 - BHC (a,b,g,d)	Not found	<0.5 mg/kg
2 - Heptachlor	Not found	<0.5 mg/kg
3 - Heptachlor Epoxide	Not found	<0.5 mg/kg
4 - Aldrin	Not found	<0.5 mg/kg
5 - Endrin	Not found	<0.5 mg/kg
6 - Dieldrin	Not found	<0.5 mg/kg
7 - Endosulfan I	Not found	<0.5 mg/kg
8 - Endosulfan II	Not found	<0.5 mg/kg
9 - 4,4' - DDE	Not found	<0.5 mg/kg
10 - 4,4' - DDD	Not found	<0.5 mg/kg
11 - 4,4' - DDT	Not found	<0.5 mg/kg
12 - Chlordane	Not found	<0.5 mg/kg
13 - Toxaphene	Not found	<5.0 mg/kg
14 - PCB's (Archlor 1254)	By GC - HECD	0.013 mg/kg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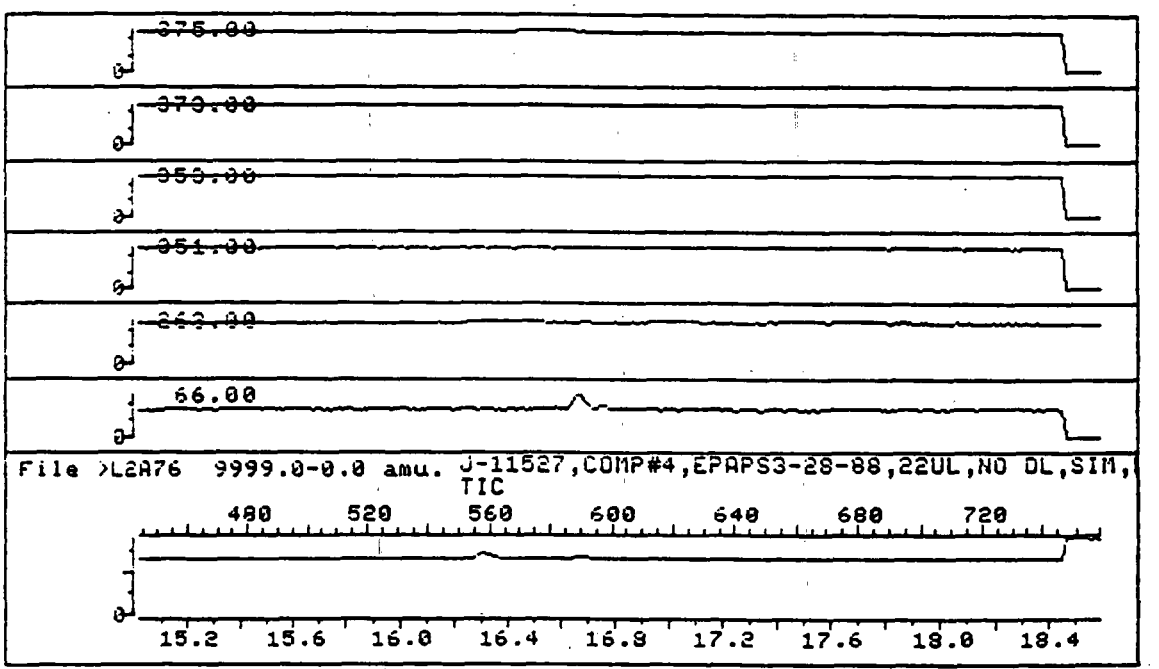
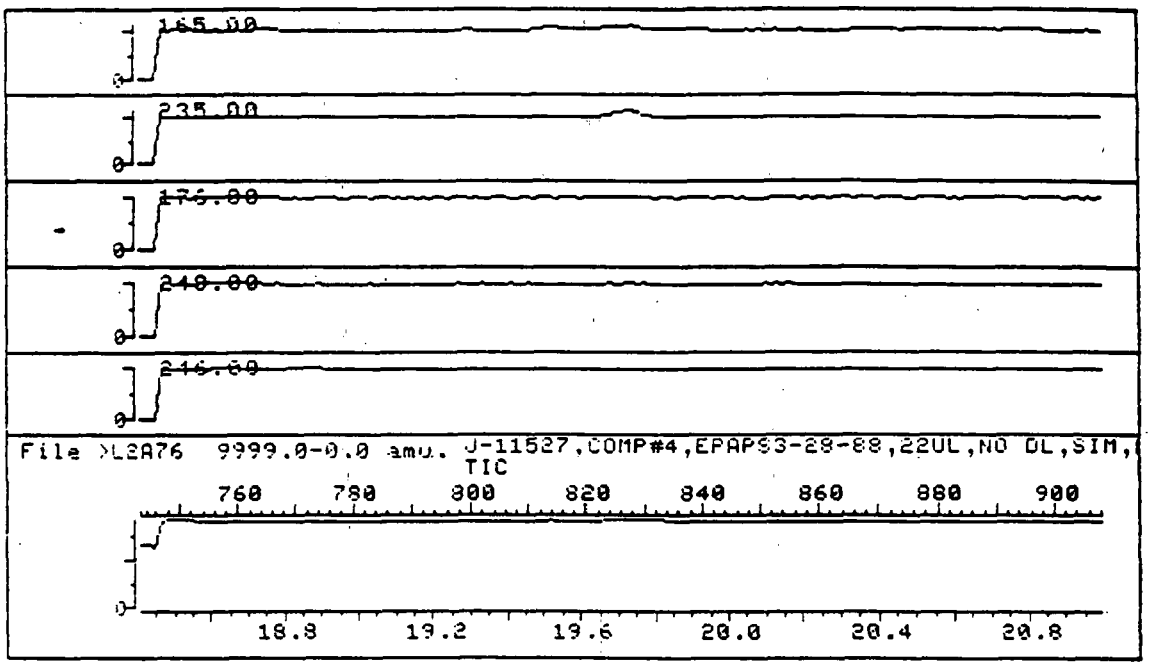
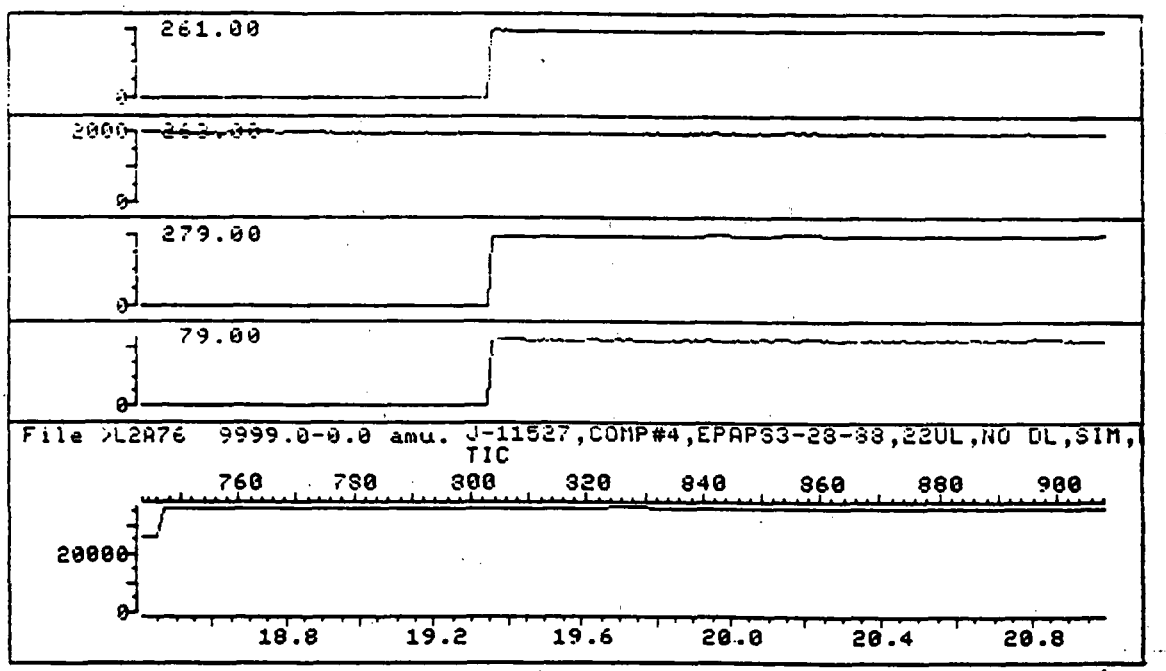
272.00
274.00
183.00
191.00
189.00
File >L2A76 9999.0-0.0 amu. J-11527,COMP#4,EPAPS3-28-88,22UL,NO DL,SIM,
TIC
100
200
300
400
500
10.0
11.0
12.0
13.0
14.0
15.0
16.0


375.00
379.00
359.00
351.00
263.00
66.00
File >L2A76 9999.0-0.0 amu. J-11527,COMP#4,EPAPS3-28-88,22UL,NO DL,SIM,
TIC
480
520
560
600
640
680
720
15.2
15.6
16.0
16.4
16.8
17.2
17.6
18.0
18.4





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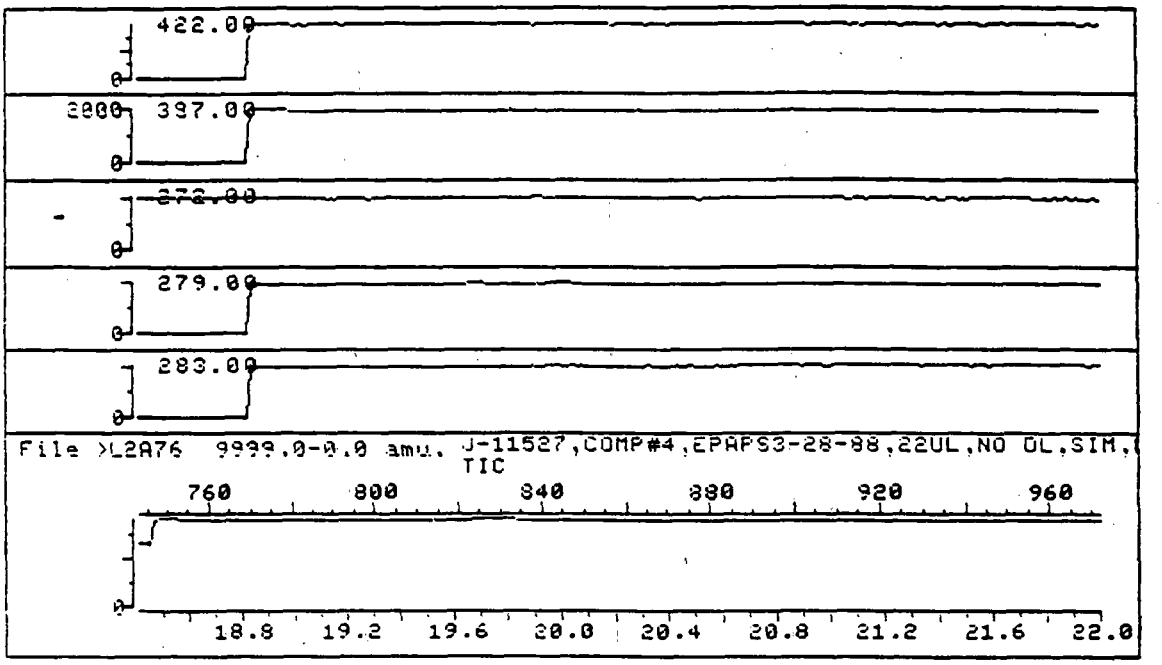
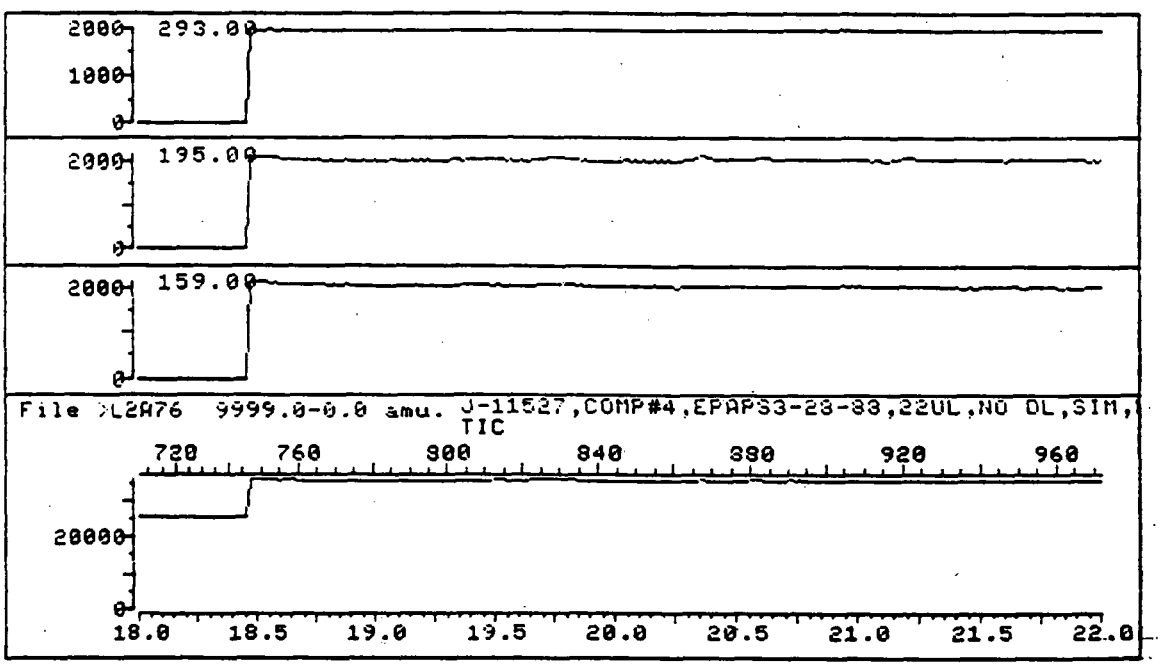


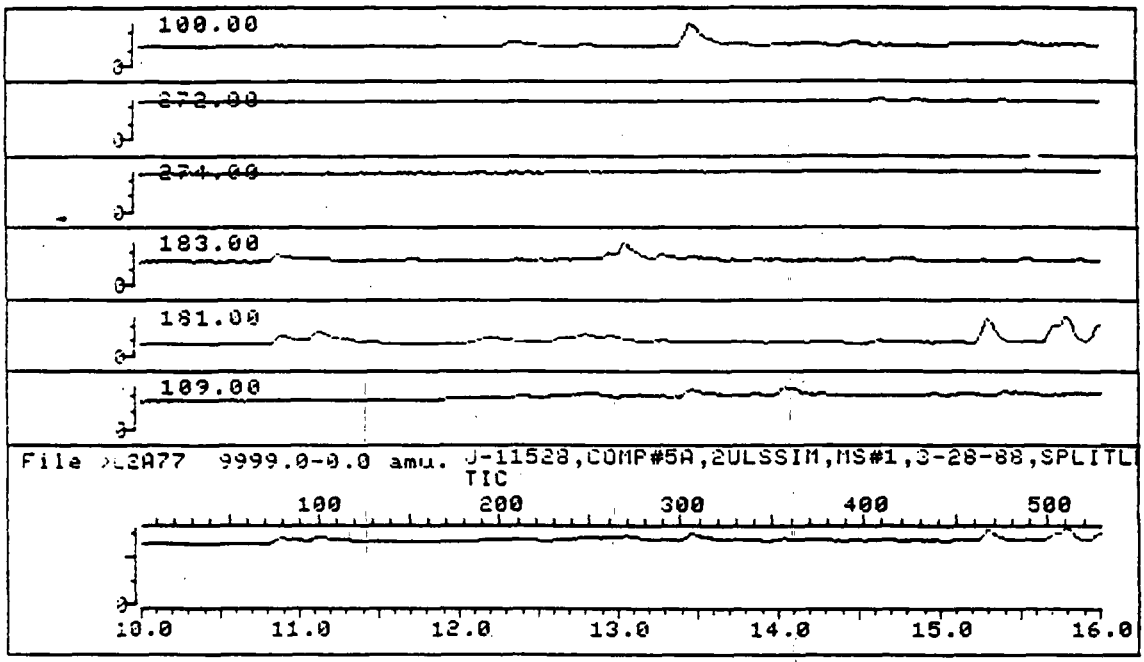


Ben Hassanein

Sample I.D. J-11528

EPA MIX PESTICIDES
RESULTS

1 - BHC (a,b,g,d)	Not found	<0.5 mg/kg
2 - Heptachlor	Not found	<0.5 mg/kg
3 - Heptachlor Epoxide	Not found	<0.5 mg/kg
4 - Aldrin	Not found	<0.5 mg/kg
5 - Endrin	Not found	<0.5 mg/kg
6 - Dieldrin	Not found	<0.5 mg/kg
7 - Endosulfan I	Not found	<0.5 mg/kg
8 - Endosulfan II	Not found	<0.5 mg/kg
9 - 4,4' - DDE	Not found	<0.5 mg/kg
10 - 4,4' - DDD	Not found	<0.5 mg/kg
11 - 4,4' - DDT	Not found	<0.5 mg/kg
12 - Chlordane	Not found	<0.5 mg/kg
13 - Toxaphene	Not found	<5.0 mg/kg
14 - PCB's (Archlor 1254)	By GC - HECD	0.116 mg/kg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272.00
274.00
183.00
181.00
109.00
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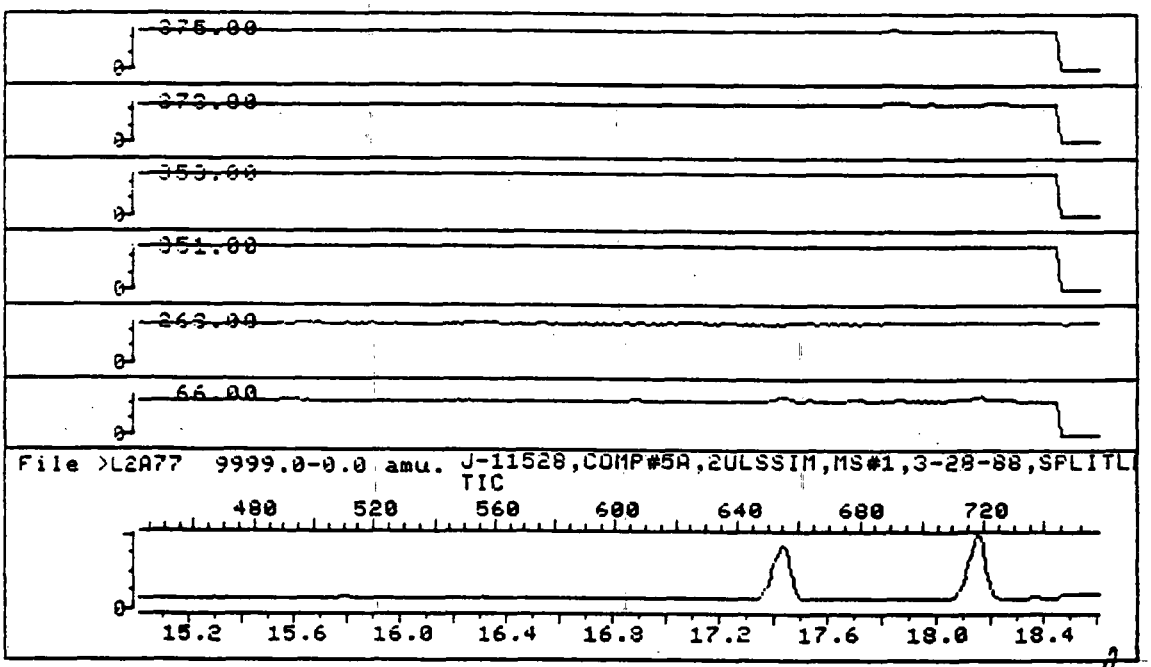
TIC
100
200
300
400
500
10.0
11.0
12.0
13.0
14.0
15.0
16.0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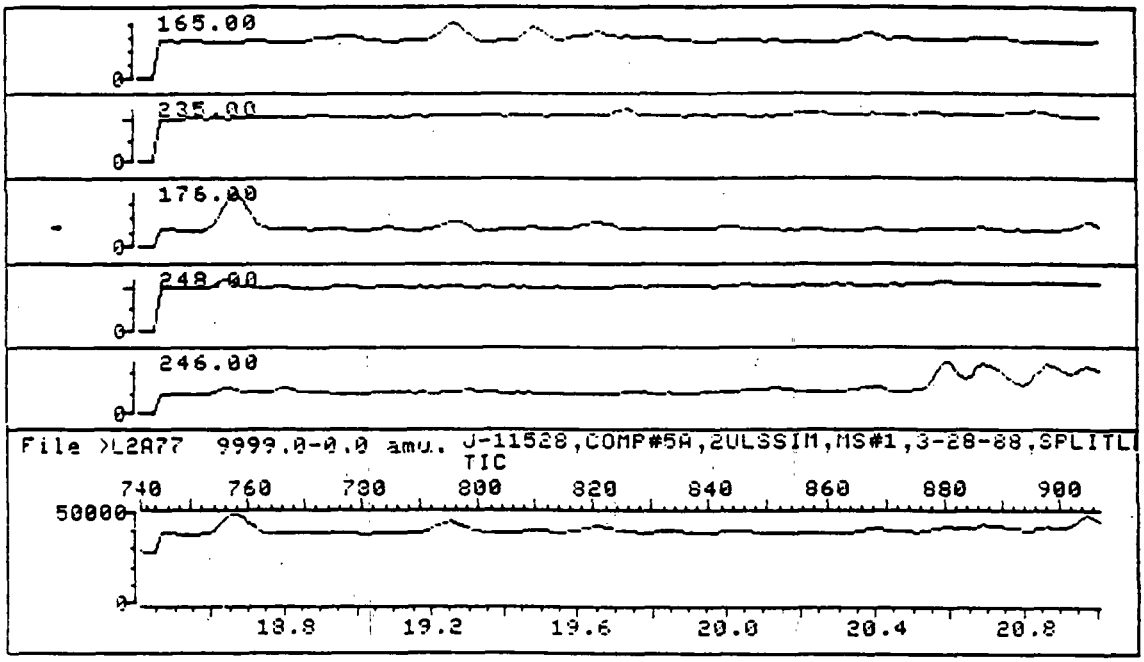
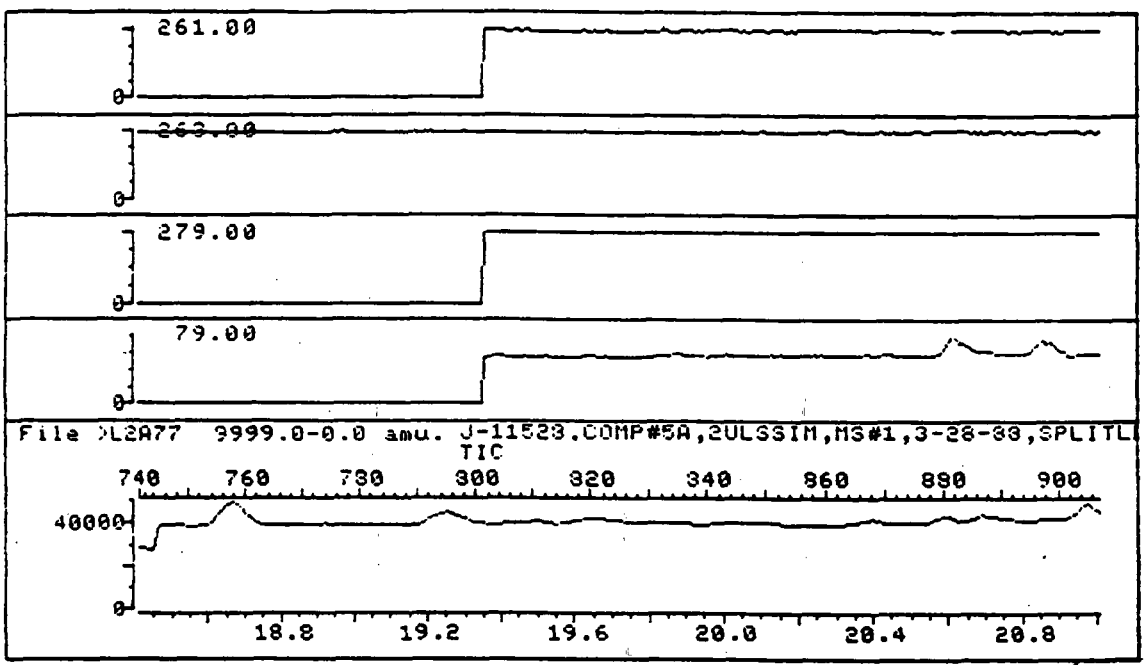
273.00
353.00
351.00
263.00
66.00
File >L2A77 9999.0-0.0 amu. J-11528,COMP#5A,2ULSSIM,MS#1,3-28-88,SPLITL
TIC
480
520
560
600
640
680
720
15.2
15.6
16.0
16.4
16.8
17.2
17.6
18.0
18.4


165.00
235.00
176.00
248.00
246.00
File >L2A77 9999.0-0.0 amu. J-11528,COMP#5A,2ULSSIM,MS#1,3-28-88,SPLITL
TIC
50000
740 760 780 800 820 840 860 880 900
18.8 19.2 19.6 20.0 20.4 20.8


261.00
263.00
279.00
79.00
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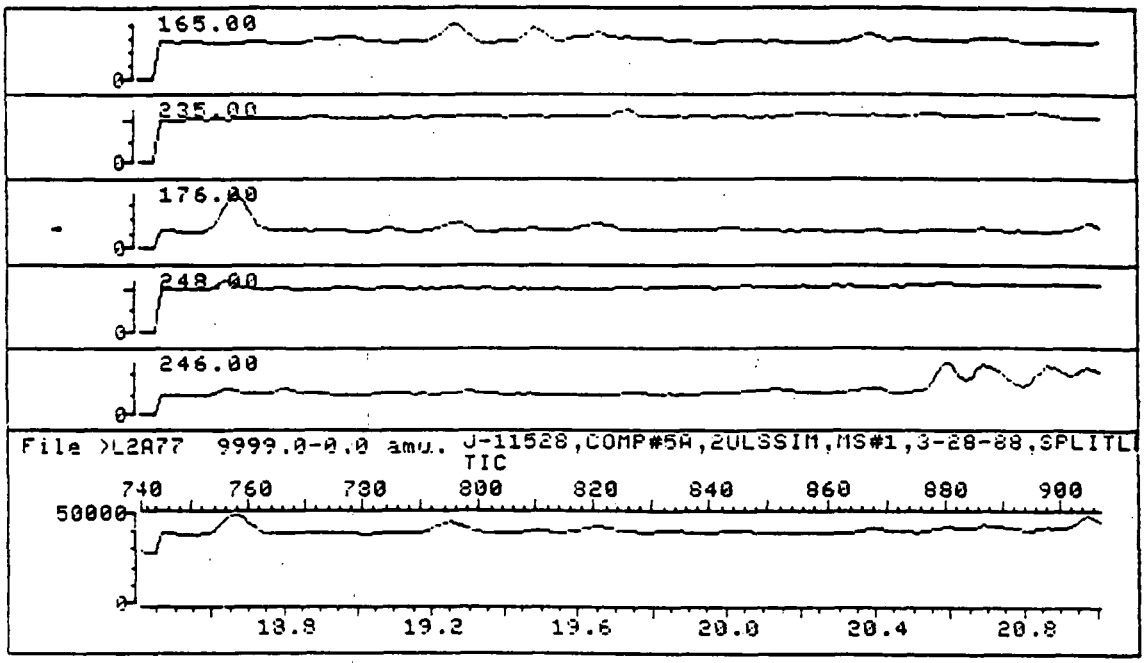
18.8 19.2 19.6 20.0 20.4 20.8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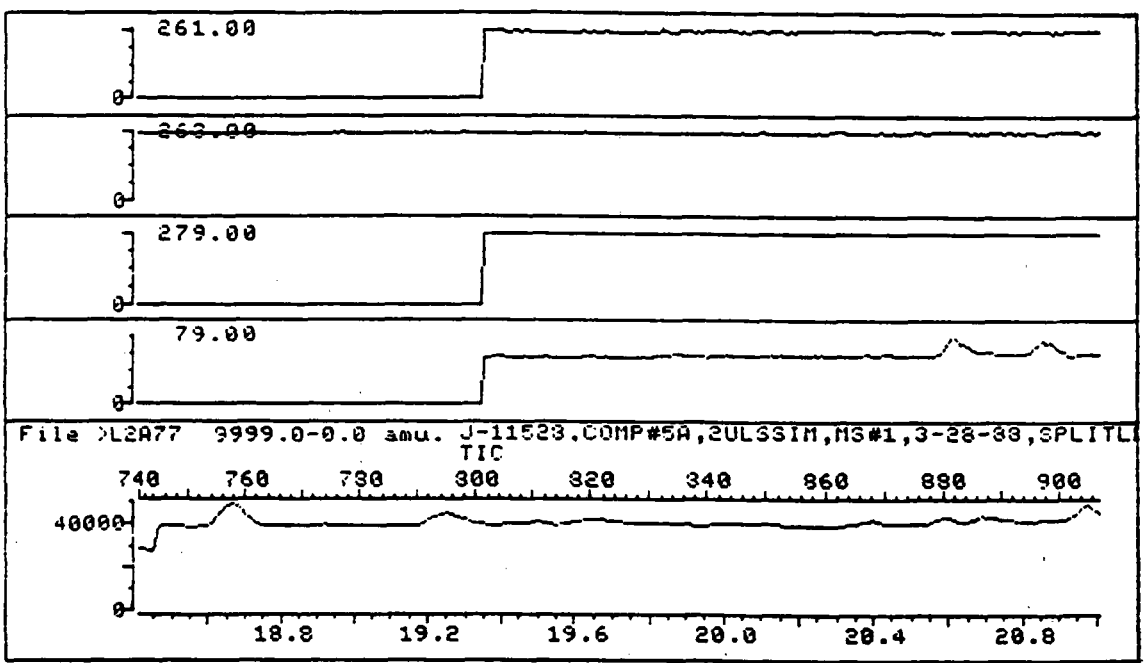
235.00
176.00
248.00
246.00
File >L2A77 9999.0-0.0 amu. J-11528,COMP#5A,2ULSSIM,MS#1,3-28-88,SPLITL
TIC
740 760 780 800 820 840 860 880 900
50000
0
18.8 19.2 19.6 20.0 20.4 20.8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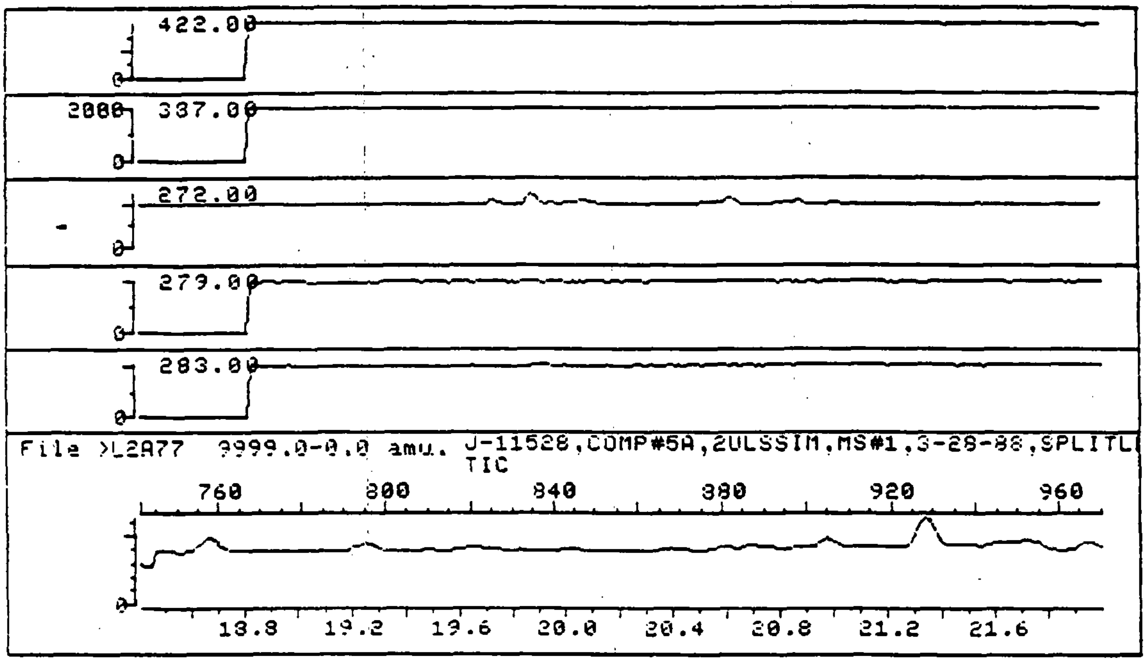
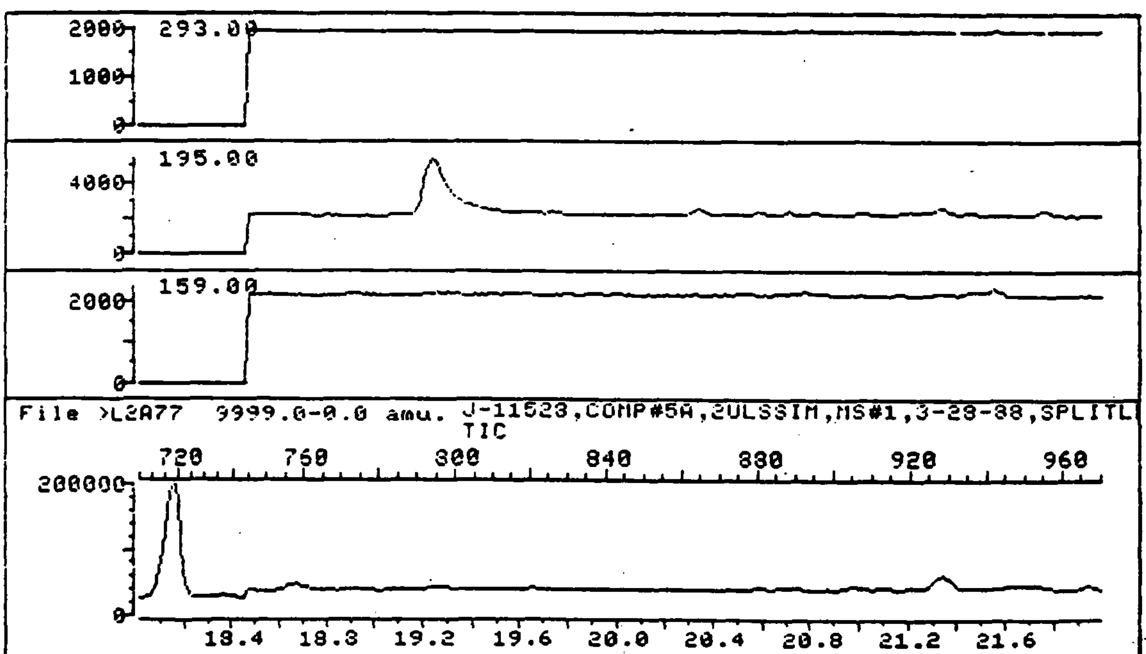
263.00
279.00
79.00
File >L2A77 9999.0-0.0 amu. J-11528,COMP#5A,2ULSSIM,MS#1,3-28-88,SPLITL
TIC
740 760 780 800 820 840 860 880 900
40000
0
18.8 19.2 19.6 20.0 20.4 20.8



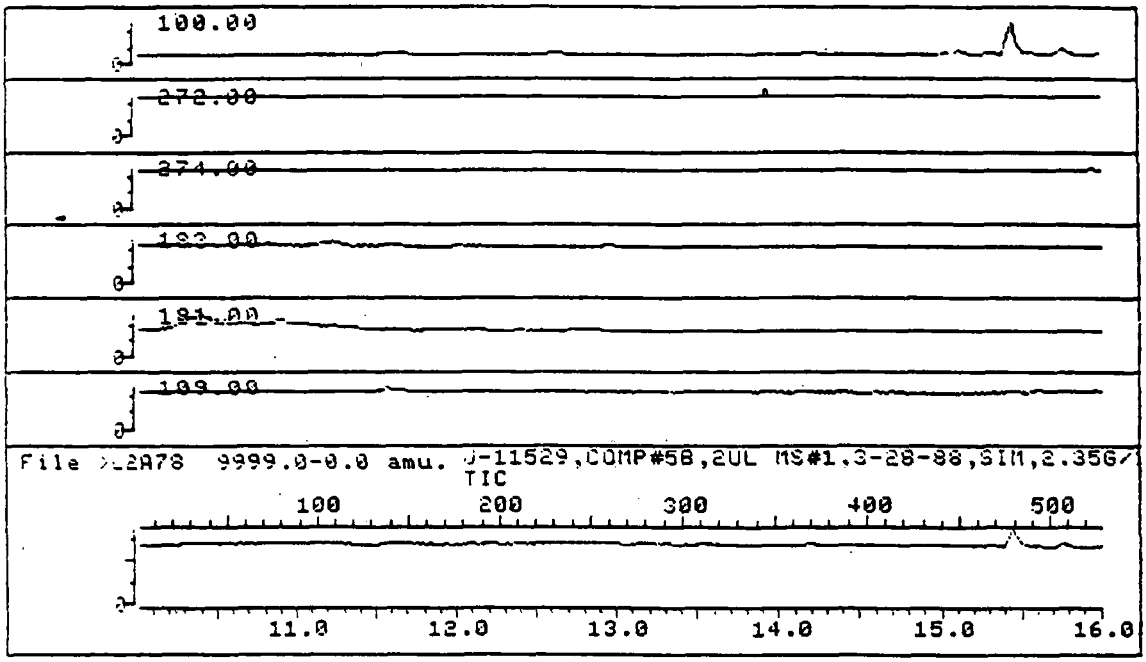


Ben Hassanian

Sample I.D. J-11529

EPA MIX PESTICIDES
RESULTS

1 - BHC (a,b,g,d)	Not found	<0.5 mg/kg
2 - Heptachlor	Not found	<0.5 mg/kg
3 - Heptachlor Epoxide	Not found	<0.5 mg/kg
4 - Aldrin	Not found	<0.5 mg/kg
5 - Endrin	Not found	<0.5 mg/kg
6 - Dieldrin	Not found	<0.5 mg/kg
7 - Endosulfan I	Not found	<0.5 mg/kg
8 - Endosulfan II	Not found	<0.5 mg/kg
9 - 4,4' - DDE	Not found	<0.5 mg/kg
10 - 4,4' - DDD	Not found	<0.5 mg/kg
11 - 4,4' - DDT	Not found	<0.5 mg/kg
12 - Chlordane	Not found	<0.5 mg/kg
13 - Toxaphene	Not found	<5.0 mg/kg
14 - PCB's (Archlor 1254)	By GC - HECD	0.002 mg/kg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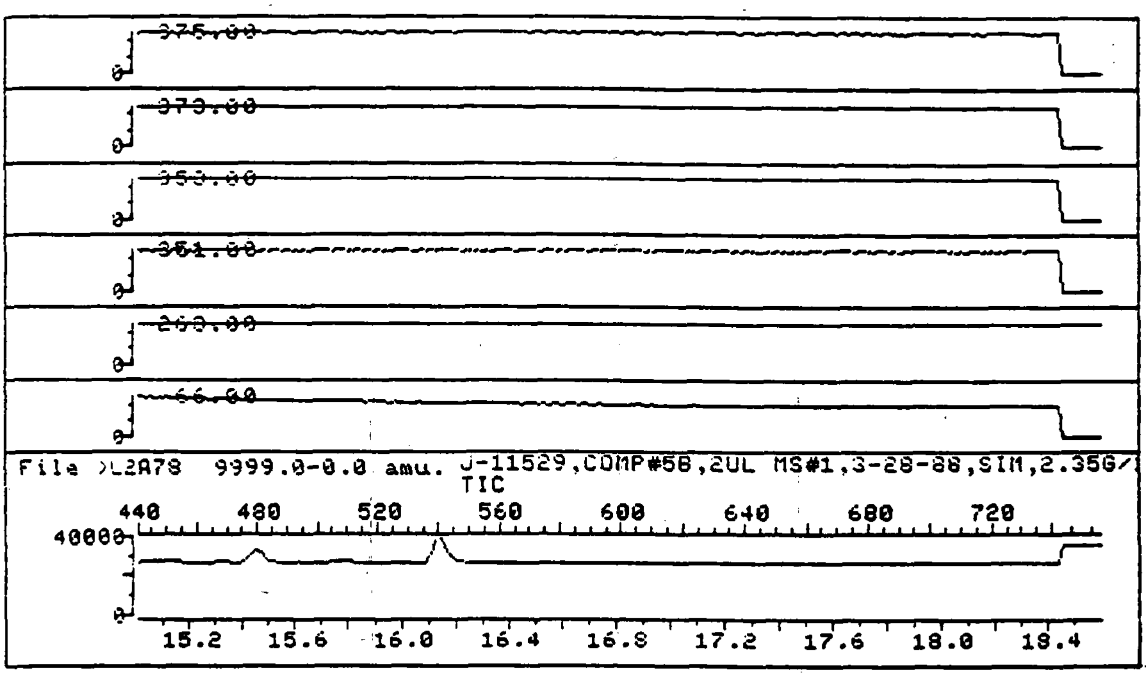
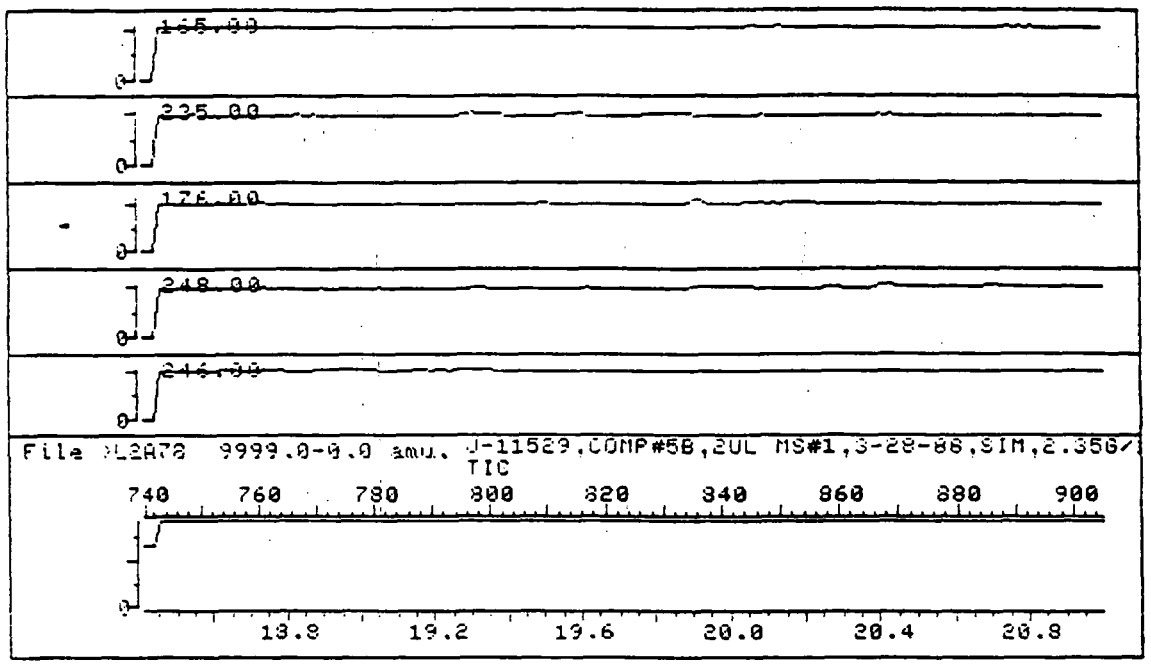
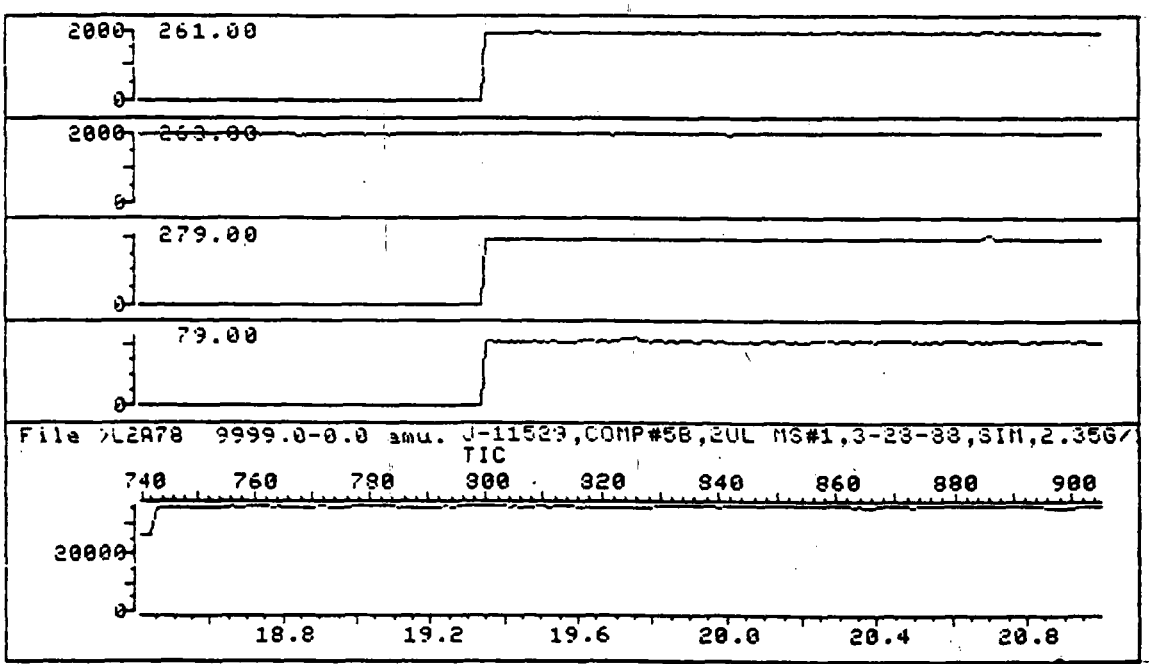
272.00
274.00
183.00
181.00
109.00
File >L2A78 9999.0-0.0 amu. J-11529,COMP#5B,2UL MS#1,3-28-88,SIM,2.35G/
TIC
100
200
300
400
500
11.0
12.0
13.0
14.0
15.0
16.0


375.00
373.00
353.00
351.00
263.00
66.00
File >L2A78 9999.0-0.0 amu. J-11529,COMP#5B,2UL MS#1,3-28-88,SIM,2.35G/
TIC
440
480
520
560
600
640
680
720
40000
15.2
15.6
16.0
16.4
16.8
17.2
17.6
18.0
18.4





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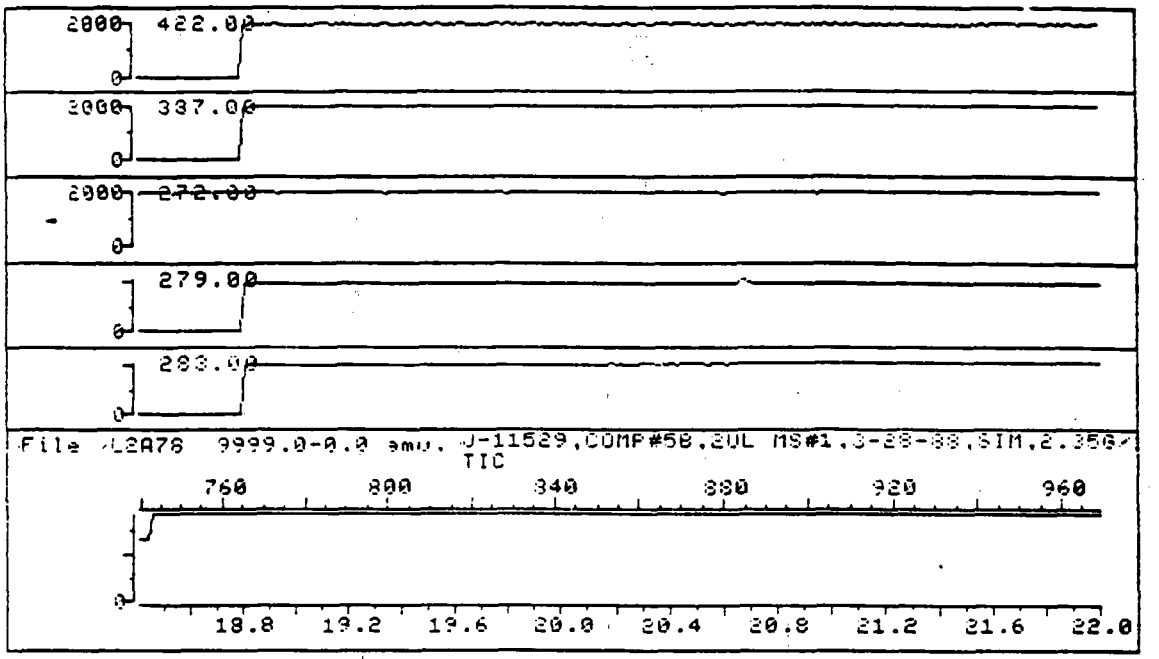
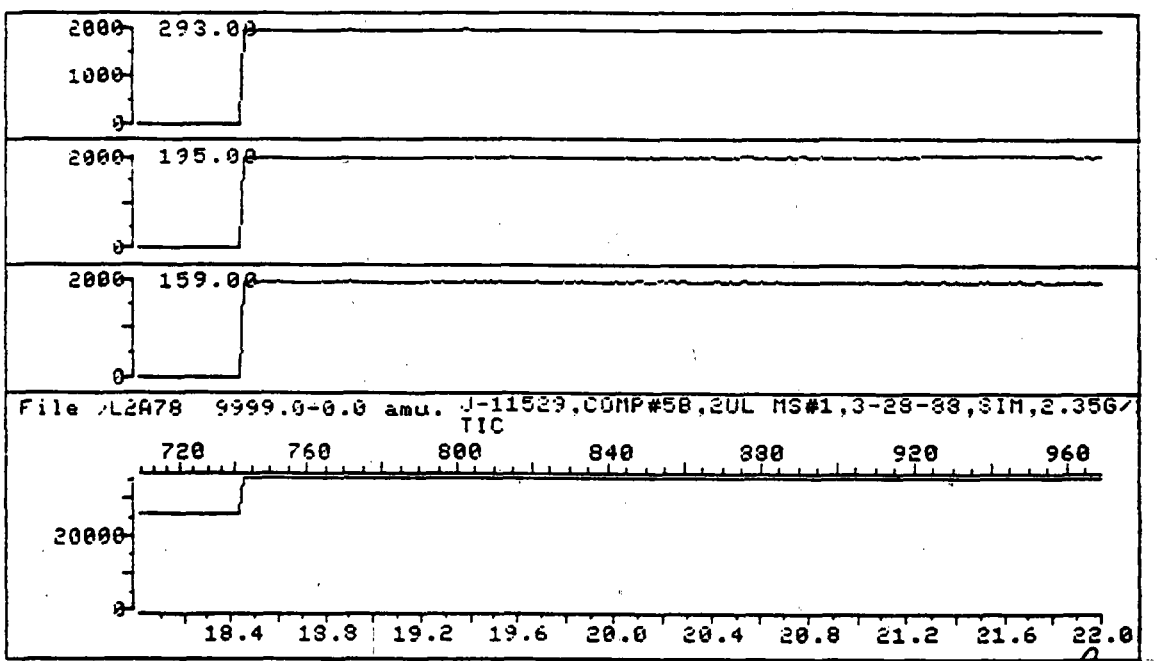
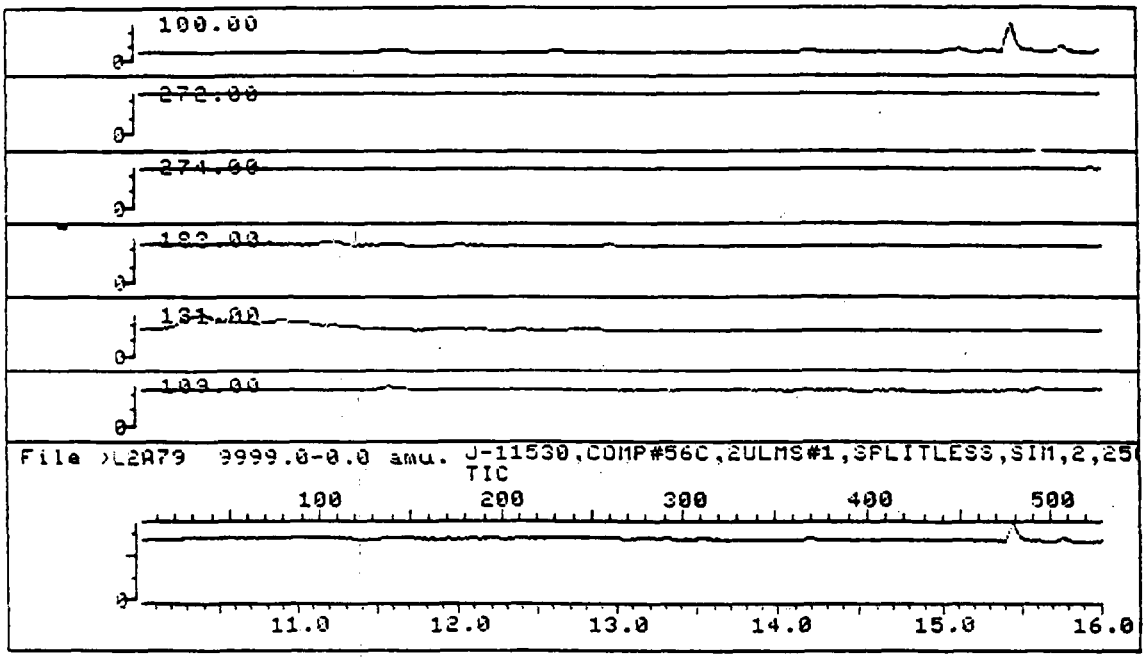

2000
422.00
0
3000
337.00
0
2000
272.00
0
279.00
0
283.00
0
File ...L2A78 9999.0-0.0 amu. J-11529,COMP#5B,2UL MS#1,3-28-88,SIM,2.35G...
TIC
760
800
840
880
920
960
0
18.8
19.2
19.6
20.0
20.4
20.8
21.2
21.6
22.0

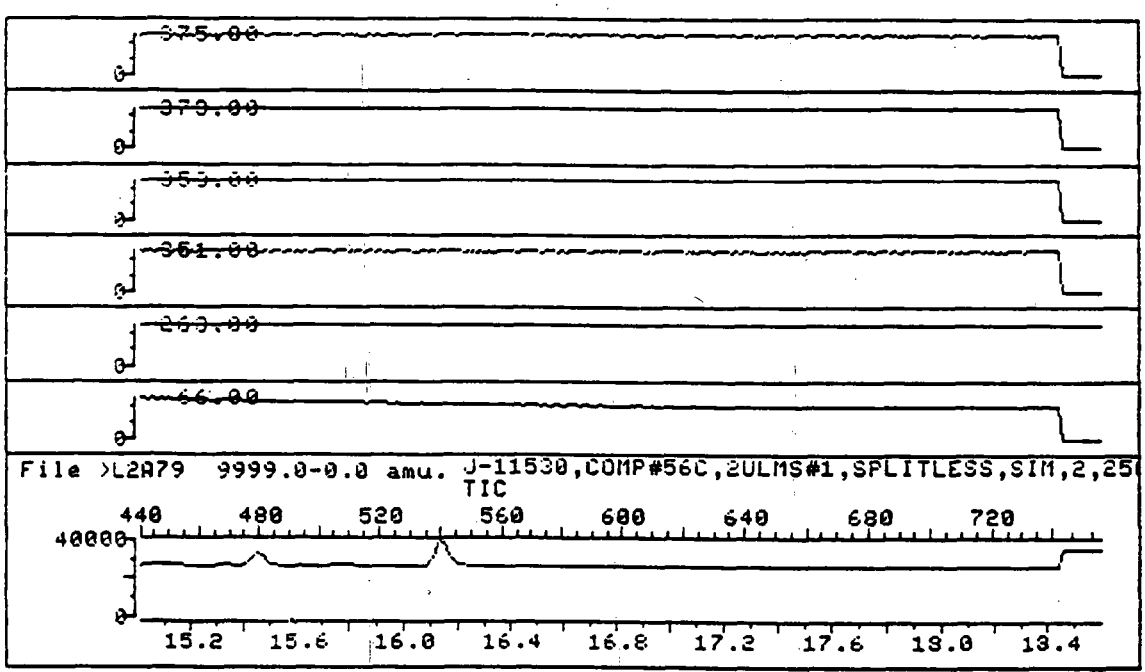

2000
293.00
1000
0
2000
195.00
0
2000
159.00
0
File ...L2A78 9999.0-0.0 amu. J-11529,COMP#5B,2UL MS#1,3-28-88,SIM,2.35G...
TIC
720
760
800
840
880
920
960
20000
0
18.4
18.8
19.2
19.6
20.0
20.4
20.8
21.2
21.6
22.0

Ben Kanouse

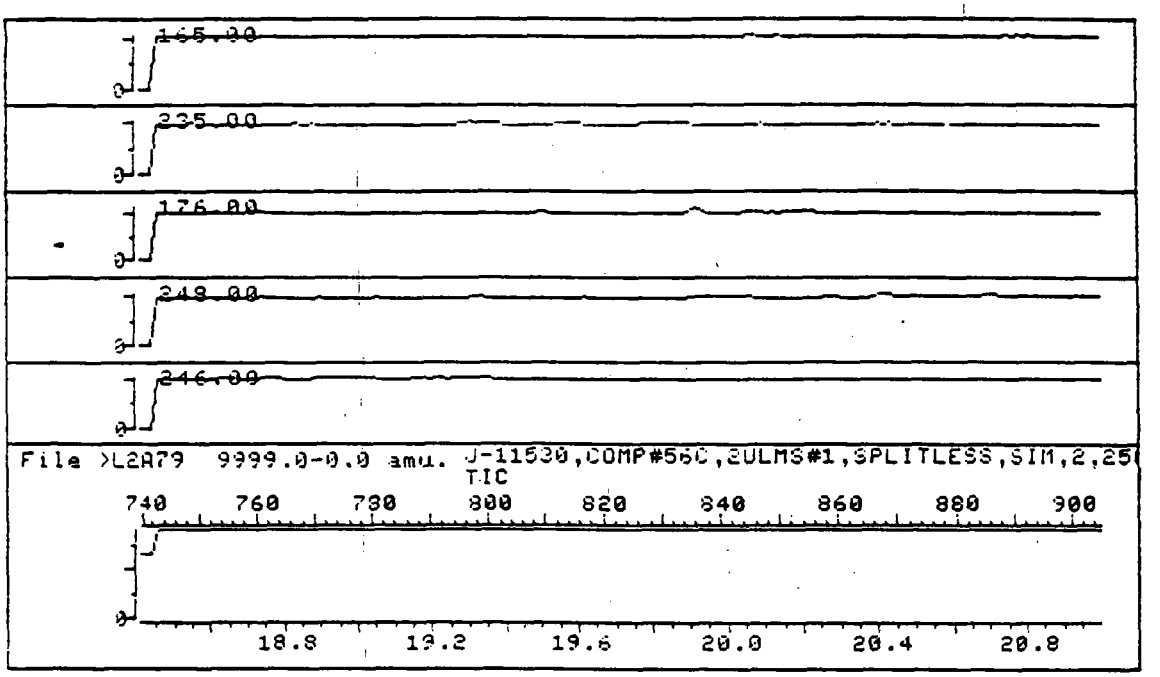
EPA MIX PESTICIDES
RESULTS

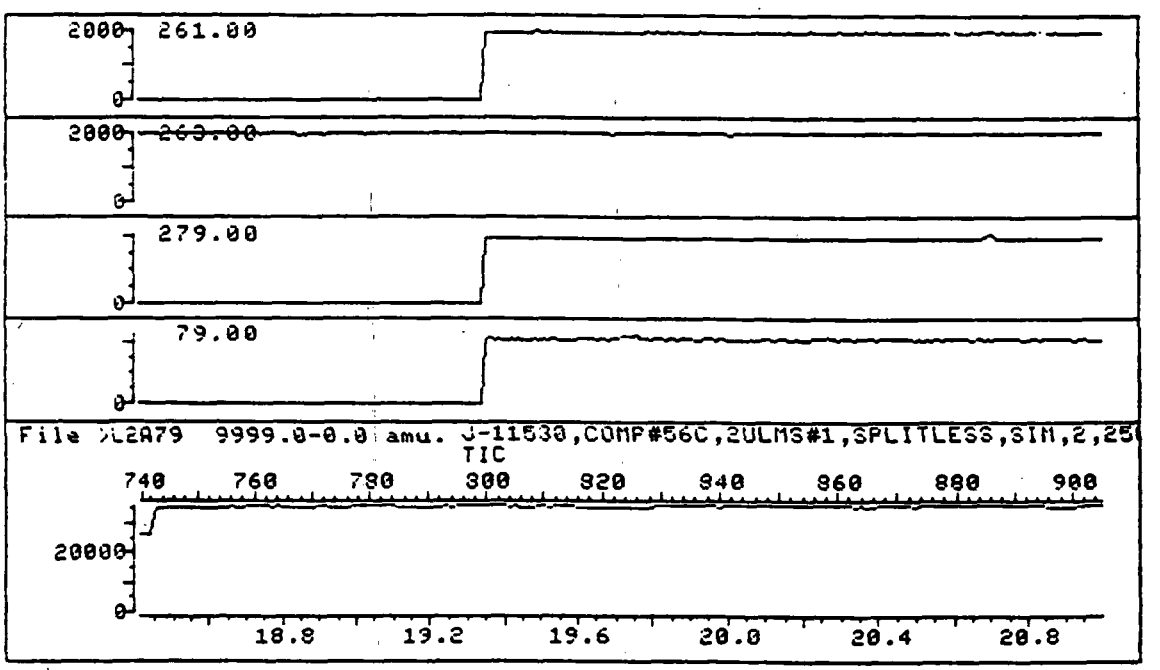
1 - BHC (a,b,g,d)	Not found	<0.5 mg/kg
2 - Heptachlor	Not found	<0.5 mg/kg
3 - Heptachlor Epoxide	Not found	<0.5 mg/kg
4 - Aldrin	Not found	<0.5 mg/kg
5 - Endrin	Not found	<0.5 mg/kg
6 - Dieldrin	Not found	<0.5 mg/kg
7 - Endosulfan I	Not found	<0.5 mg/kg
8 - Endosulfan II	Not found	<0.5 mg/kg
9 - 4,4' - DDE	Not found	<0.5 mg/kg
10 - 4,4' - DDD	Not found	<0.5 mg/kg
11 - 4,4' - DDT	Not found	<0.5 mg/kg
12 - Chlordane	Not found	<0.5 mg/kg
13 - Toxaphene	Not found	<5.0 mg/kg
14 - PCB's (Archlor 1254)	By GC - HECD	0.290 mg/kg



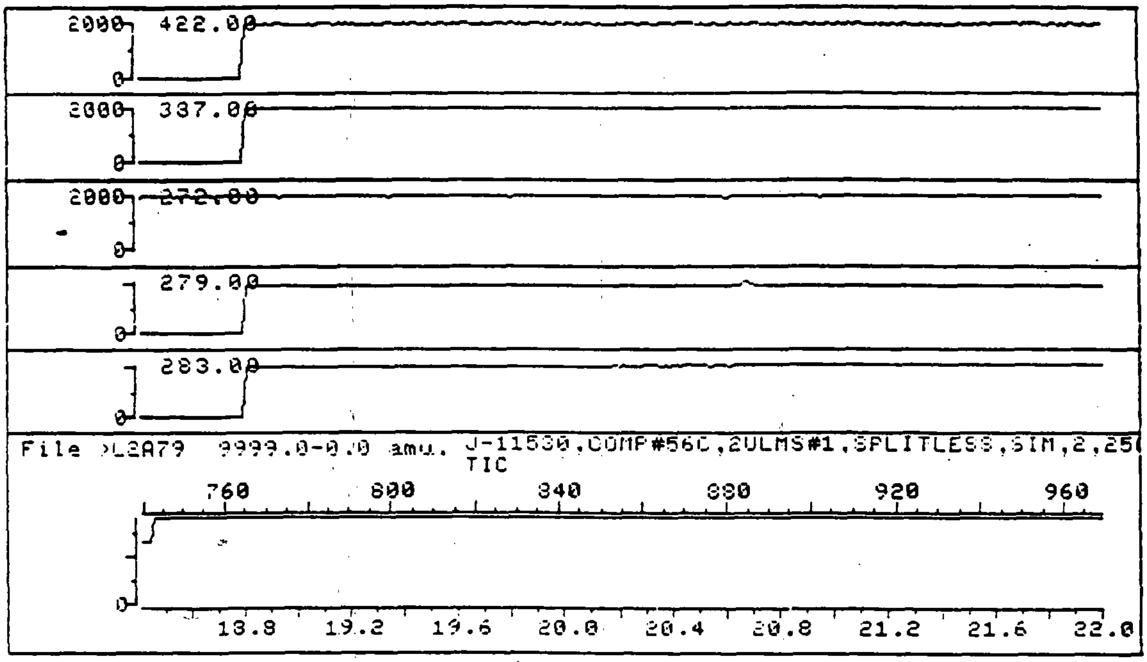


Ben Hassanian





Ben Hovsepian



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2000
337.00
0
2000
272.00
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283.00
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File >L2A79 9999.0-0.0 amu. J-11530,COMP#56C,2ULMS#1,SPLITLESS,SIM,2,25
TIC
760
800
840
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18.8
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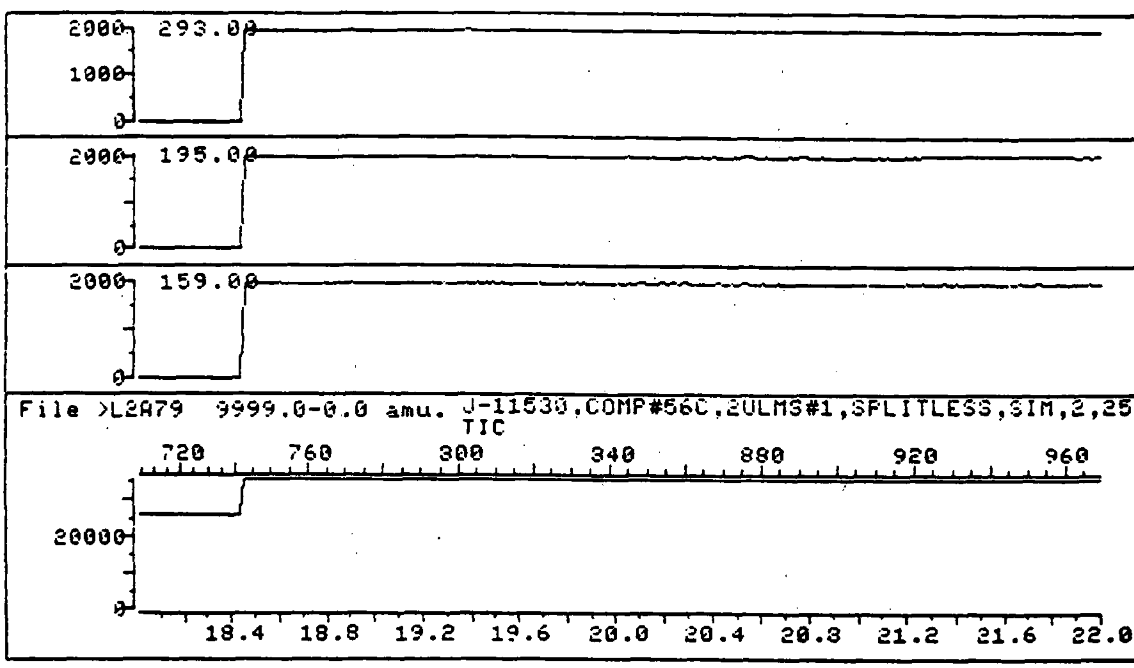

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TIC
720
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20.4
20.8
21.2
21.6
22.0

CHANNEL A INJECT [illegible]/28/88 07:02:50

AZ 1

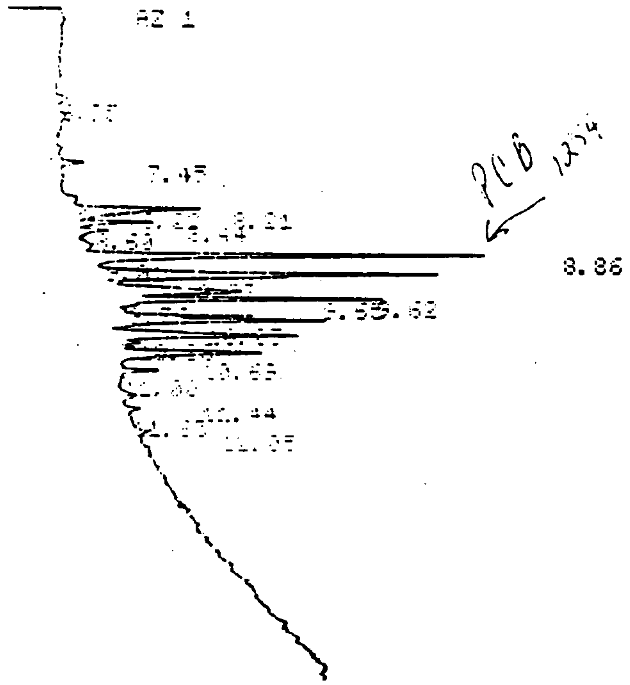
NO DATA, CHANNEL

0.4 g - 115.28   2.3g → 10 ml then 5 ml   1 ml

CHANNEL A INJECT 03/28/88 07:09:15

1.15 gms → 1 ml
= 0.13 ug / ml = .13 ug / 1.15 gm
= 0.116 mg / kg

AZ 1



[illegible] 07:09:15 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 3 INDEX 3

PEAK#	AREA%	RT	AREA BC
1	16.077	~~2.89~~	4329 02
2	8.527	~~3.38~~	2296 03
3	1.081	~~6.15~~	291 01
4	0.873	~~7.45~~	235 01
5	0.561	8.03	151 02
6	1.43	8.21	385 02
7	3.628	8.22	977 02
8	1.703	8.44	460 02
9	0.771	8.6	208 03
10	0.227	8.86	60 02
11	10.094	9.01	2718 02
12	[illegible]	9.33	2373 02
13	4.765	9.62	1283 02
14	1.367	9.65	368 02
15	9.459	9.76	2547 02
16	10.065	10.05	2710 02
17	7.892	10.38	2125 02
18	6.113	10.69	1646 02
[illegible]	[illegible]	11.	[illegible]
20	0.702	11.44	189 02
21	0.345	11.65	93 03
22	0.193	~~12.05~~	52 01
TOTAL	100.		26926

$\frac{14773}{42272} \times 5.1 \times \frac{0.5}{10} \times 1 \times \frac{10}{5} = 0.2659$ ug/sample

$\frac{0.2659}{2.3} \times \frac{1000}{1000} = 0.116$ mg/kg

CHANNEL A INJECT 03/28/88 07:33:56

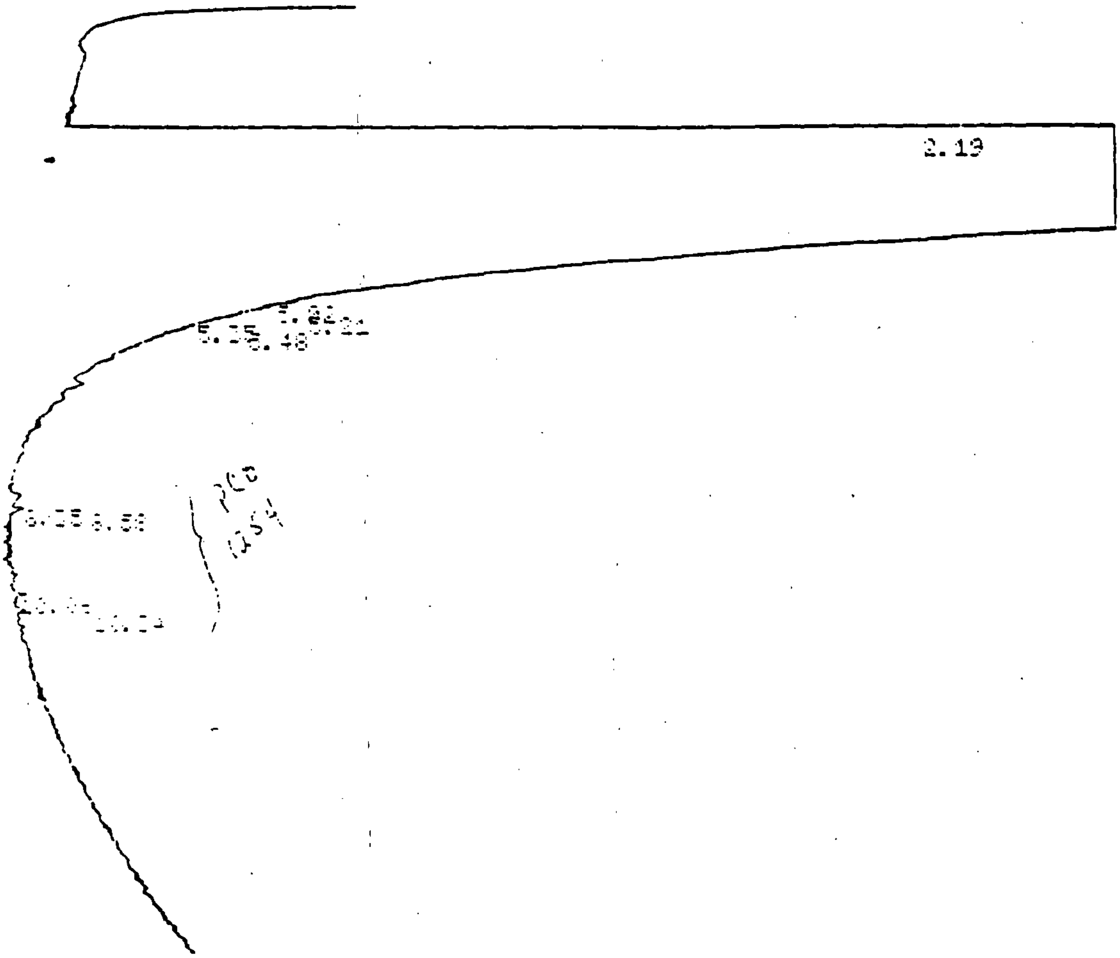
1 ul x PCB std 1254 @ 11.9 ppm. [illegible]

[illegible]	[illegible]	[illegible]	[illegible] 02
24	0.295	11.05	295 02
25	0.317	[illegible].18	317 02
26	0.975	[illegible]34	974 02
27	0.333	[illegible]61	333 03
28	0.222	[illegible].98	222 01

TOTAL 100. 99935

[illegible] 2.2g → 10 ml . 5 ml → 1 ml

CHANNEL A INJECT 03/28/88 08:00:04



03/28/88 08:00:04 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 5 INDEX 5

PEAK#	AREA%	RT	AREA BC
1	97.724	2.19	616849 02
2	0.746	5.02	4712 02
3	0.372	5.21	2346 02
4	0.287	5.35	1811 02
5	0.817	5.48	5154 01
6	0.024	8.35	151 02
7	0.014	8.58	88 03
8	0.007	10.05	47 01
9	0.01	10.34	60 01

} 346

TOTAL 100. 631218

[illegible] 2.2g → 10 ml. clean 5 → 1 ml

Handwritten calculations:

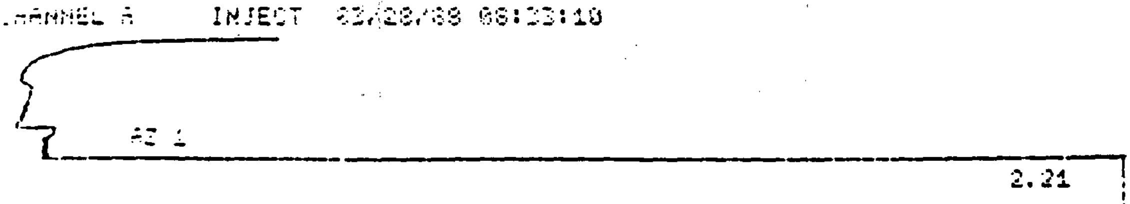
$\frac{346}{13193} \times 1.78 \times \frac{1}{10}$ [should be 0.5] $= .0047$ ug/ml

$.0047 \times 1 \times \frac{10}{5} = .0093$ ug/sample

$\frac{.0093}{2.2} \times \frac{1000}{1000} = 0.004$ mg/kg

$\frac{1}{2} = 0.002$ mg/kg

CHANNEL A INJECT 03/28/88 08:23:10



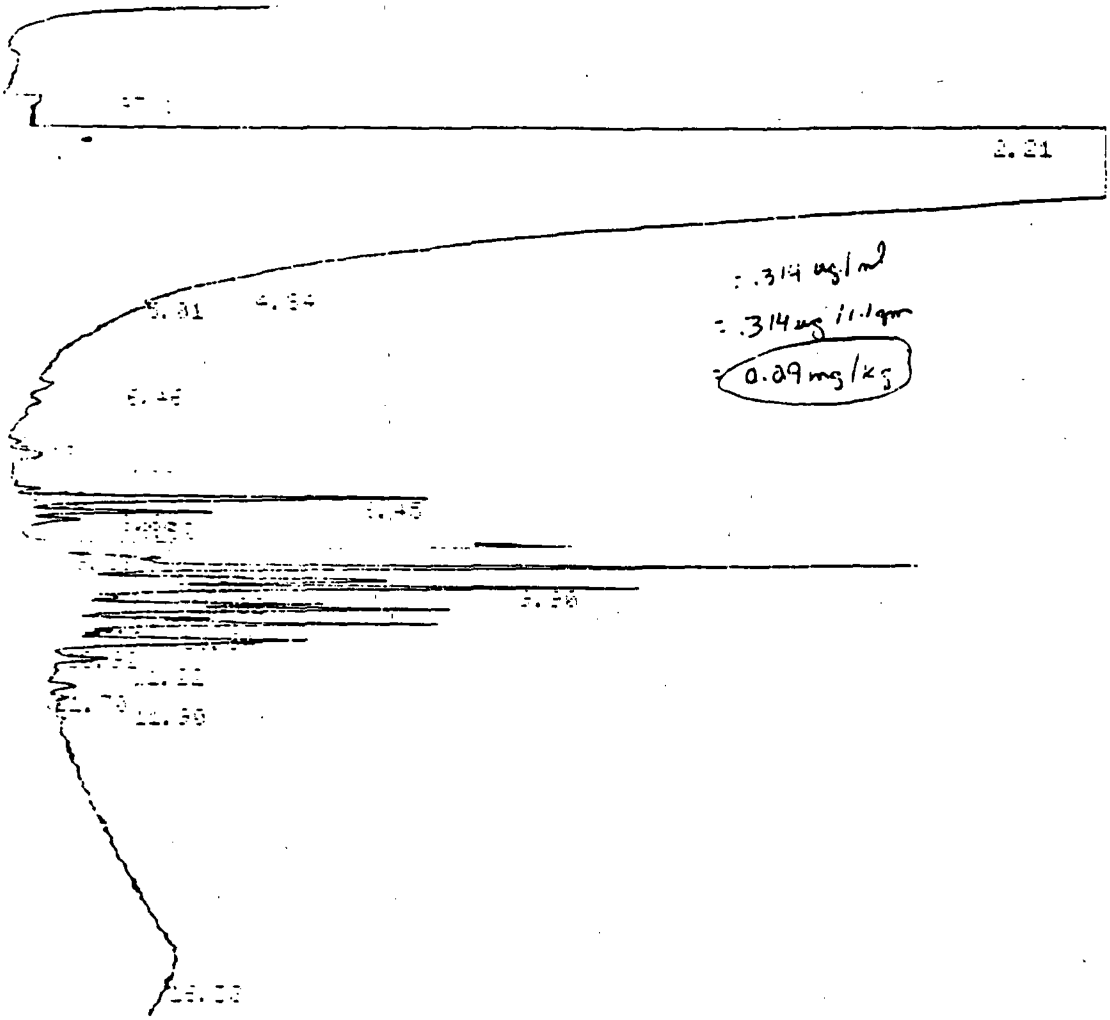
7	0.024	9.58	88	01
8	0.007	10.06	47	01
9	0.01	1[illegible]	60	01

} 346   .0093 / 2.2

TOTAL 100. 631218

6.9 X [illegible] 11530 2.2g → 10 ml then 5 → 1 ml

CHANNEL A INJECT 03/28/88 08:22:10



03/28/88 08:33:10 CH= "A" PS= 1.

LE 1. METHOD 0. RUN 6 INDEX 5

PK#	AREA%	RT	AREA	BC
1	[illegible]	2.21	347773	02
2	[illegible]	4.84	2542	02
3	1.337	5.01	8027	02
4	0.083	6.46	346	03
5	0.021	7.46	87	01
6	0.12	7.68	498	01
7	0.033	8.3	138	02
8	0.894	8.45	3703	02
9	0.294	8.63	1217	02
10	0.133	8.82	552	03
11	1.712	9.28	7095	02
12	2.163	9.65	8964	02
13	0.918	9.9	3803	02
14	1.51	10.02	6258	02
15	1.405	10.37	5824	02
16	1.119	10.64	4639	02
17	0.799	10.92	3309	02
18	0.157	11.22	918	02
19	0.071	11.7	293	02
20	0.035	11.9	147	03
21	2.015	16.38	8350	01

should be [illegible]

46631 / 42272 × 5.7 × 1/10 = 0.6288 ug/ml

0.6288 × 1 × 10/5 = 1.2576 ug/sample

1.2576 / 2.2 × 1000/1000 = 0.58 mg/kg

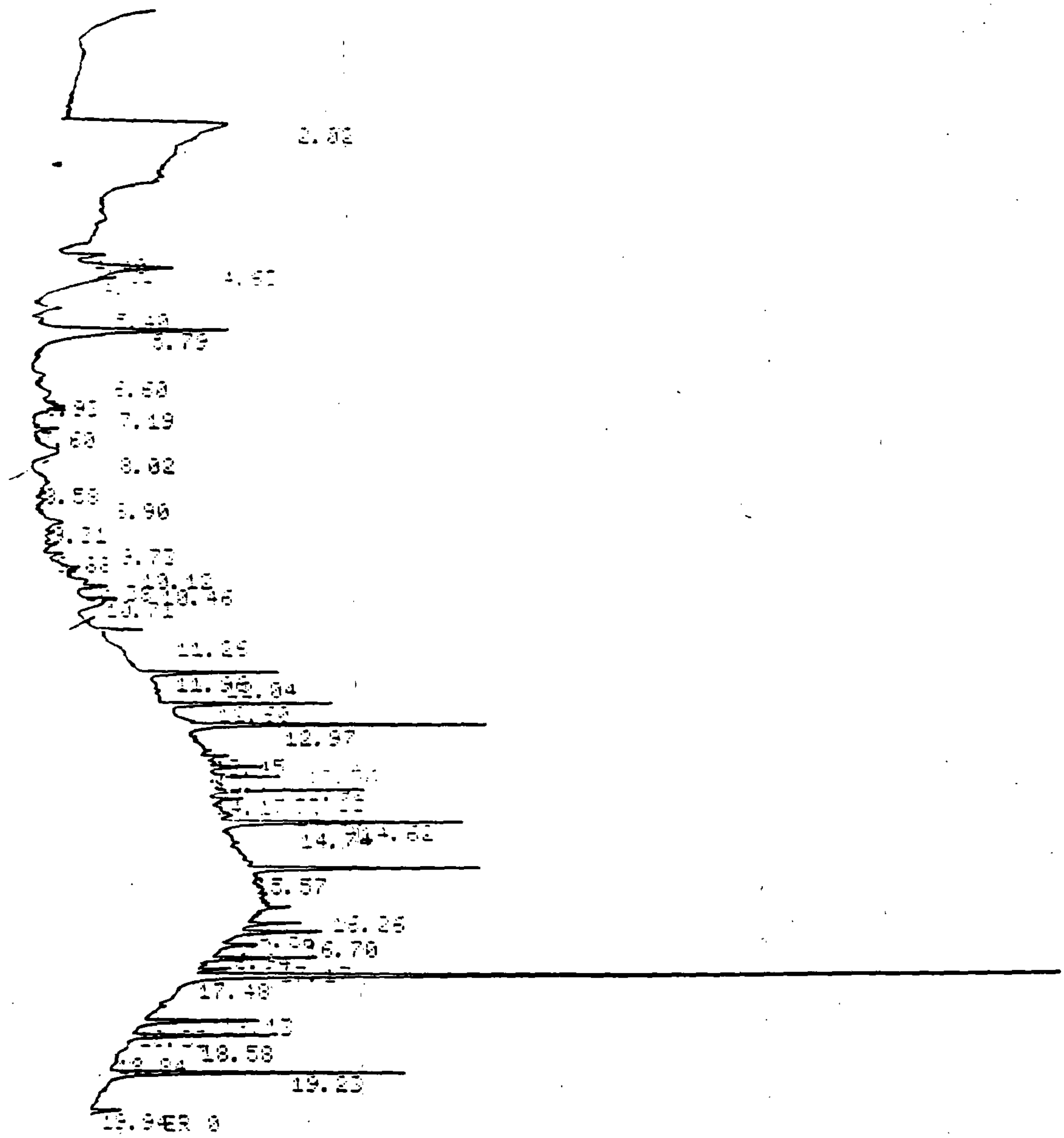
÷ 2 = 0.29 mg/kg

21 2.015 16.38 8350 01

TOTAL 100. 414182

104x g. 11536 2.23 g 5 ml, 5 ml → 0.1 ml

CHANNEL A INJECT 03/28/88 08:58:26



03/28/88 08:58:26 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 7 INDEX 7

PEAK#	AREA%	RT	AREA BC
1	11.283	2.02	7441 01
2	0.472	4.4	311 02
3	3.154	4.63	2080 02
4	1.086	4.83	716 03
5	3.052	5.79	2013 01
6	0.17	6.6	112 01
7	0.422	6.93	278 02
8	0.549	7.19	362 03
9	0.132	7.6	87 01
10	0.675	8.02	445 01 ✓
11	0.393	8.58	259 01
12	0.035	8.9	23 01
13	0.338	9.31	223 01
14	0.055	9.73	36 01
15	0.114	9.88	75 01
16	0.238	10.12	157 01
17	0.256	10.79	[illegible]

1533 / 33119 / 15.14 x 1/10 = .0213 x 0.1 x 10/5 = .0043 ug in sample

standard in 0.5 ∴ ppm ÷ 2

.0043 / .23 / 1000/1000 = 0.002 mg/kg

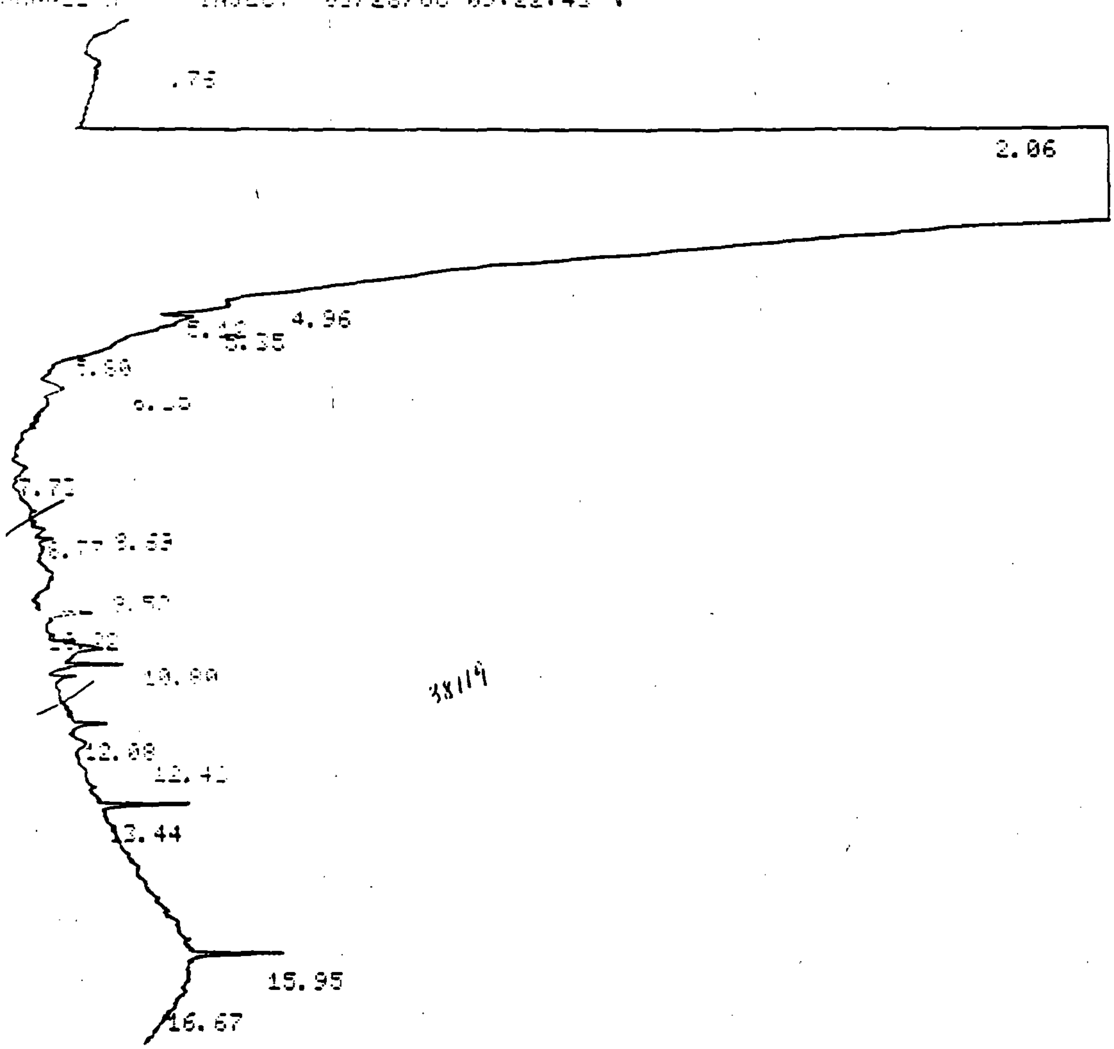
0.002 ÷ 2 = 0.001 mg/kg

19	0.297	10.71	196 01
20	0.332	11.26	219 02
21	0.365	11.96	241 02
22	1.162	[illegible].04	766 03
23	1.031	[illegible].6	680 01
24	2.15	12.97	1418 01
25	0.258	13.45	170 02
26	0.553	13.56	365 02
27	0.998	13.73	658 02
28	1.275	13.92	841 02
29	2.329	14.17	1536 02
30	1.125	14.33	742 02
31	1.569	14.62	1035 02
32	3.826	14.74	2523 02
33	11.967	15.57	7892 02
34	13.62	16.26	8982 02
35	3.034	16.56	2001 02
36	4.293	16.7	2831 02
37	3.159	16.94	2083 02
38	3.926	17.17	2589 02
39	13.7	17.48	9035 02
40	0.955	18.13	630 02
41	1.61	18.33	1062 02
42	1.351	18.58	891 02
43	0.143	18.84	94 03
44	2.159	19.23	1424 01
45	0.109	19.94	72 01

TOTAL 100. 65949

Dg'l 3.11527 2.19g → 11 mis then 2 mis → 0.25 mis = .434gm 8:1 conc.

CHANNEL A INJECT 03/28/88 09:22:43



03/28/88 09:22:43 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 8 INDEX 8

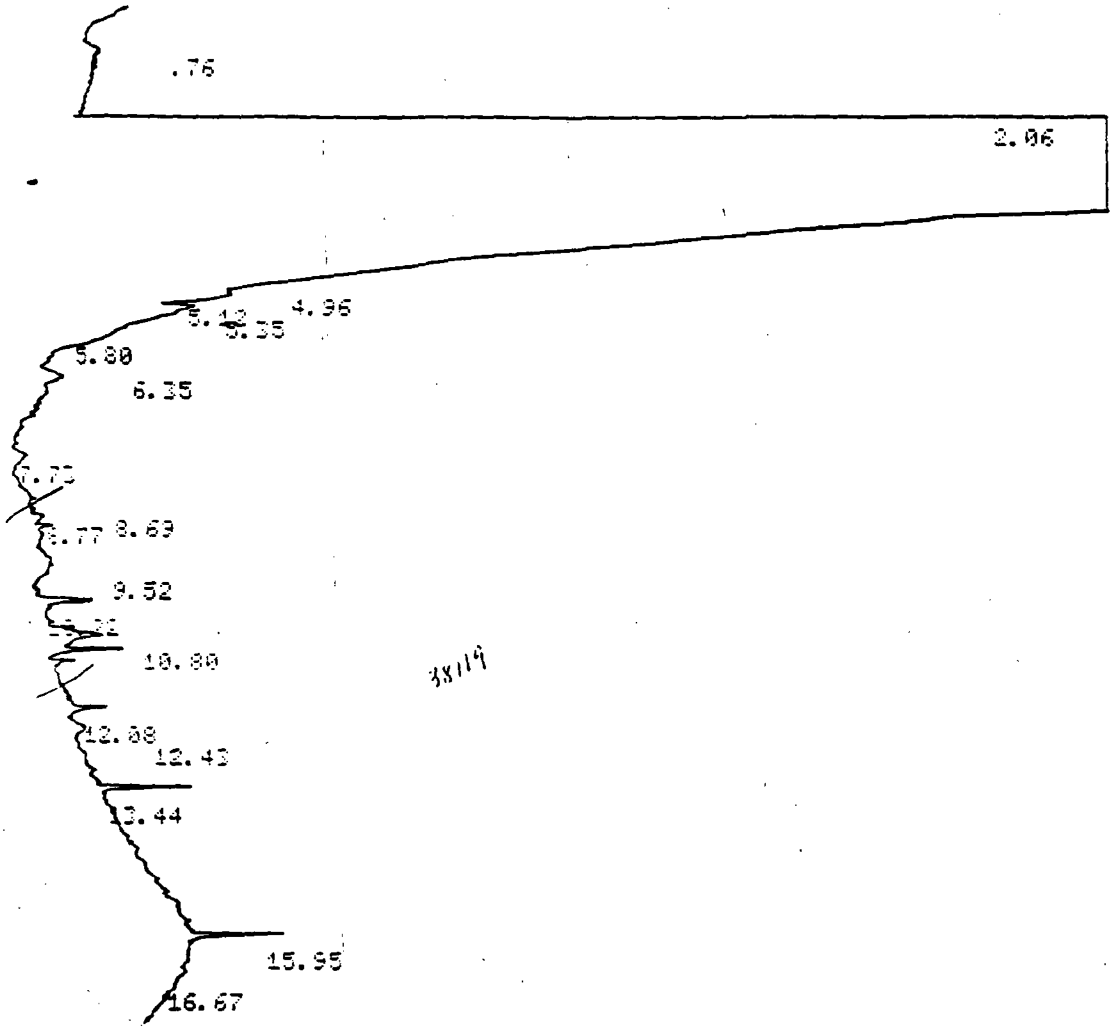
PEAK# AREA% RT AREA BC

43	0.143	18.84	94	03
44	2.159	19.23	1424	01
45	0.109	19.94	72	01

TOTAL 100. 65949

2.17g - 1 mls then 2 mls → 0.25 mls = .434 gm 8:1 conc.

CHANNEL A INJECT 03/28/88 09:22:43



03/28/88 09:22:43 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 8 INDEX 8

PEAK#	AREA%	RT	AREA	BC
1	0.049	0.76	283	01
2	94.427	2.06	549862	02
3	0.669	4.96	3893	02
4	0.524	5.12	3051	02
5	0.414	5.35	2413	02
6	0.009	5.8	50	03
7	0.052	6.35	300	01
8	0.037	7.73	215	01
9	0.021	8.69	120	02
10	0.022	8.77	130	03
11	0.096	9.52	558	02
12	0.117	10.22	683	02
13	0.346	10.8	2015	02
14	0.162	12.08	945	02
15	0.073	12.43	428	02
16	0.249	13.44	1448	02
17	2.373	15.95	13821	02
18	0.361	16.67	2101	03

TOTAL 100. 582316

0.5 ml 1254 std @ 5.9 ppm

$\frac{3376}{16847} \times 2.27 \times \frac{0.5}{10} = .0227$ ug/ml

$.0227 \times 0.25 = .005686 \times \frac{10}{2} = .0284$ ug/2.17g

$.0284 \times \frac{1000}{2.17} \div 1000 = .013$ ug/kg aroclor 1254

CHANNEL A INJECT 03/28/88 09:45:27

PEAK#	AREA%	RT	AREA	BC
1	0.049	.76	283	01
2	94.427	.06	549862	02
3	0.669	.96	3893	02
4	0.524	5.12	3051	02
5	0.414	5.35	2413	02
6	0.009	5.8	50	03
7	0.052	6.35	300	01
8	0.037	7.73	215	01
9	0.021	8.69	120	02 ✓
10	0.022	8.77	130	03 ✓
11	0.096	9.52	558	02 ✓
12	0.117	10.22	683	02 ✓
13	0.346	10.8	2015	02 ✓
14	0.162	12.08	945	02
15	0.073	12.43	428	02
16	0.249	13.44	1448	02
17	2.373	15.95	13821	02
18	0.361	16.67	2101	03

TOTAL 100. 582316

0.5 ml 1254 std @ 5.7 ppm ↓

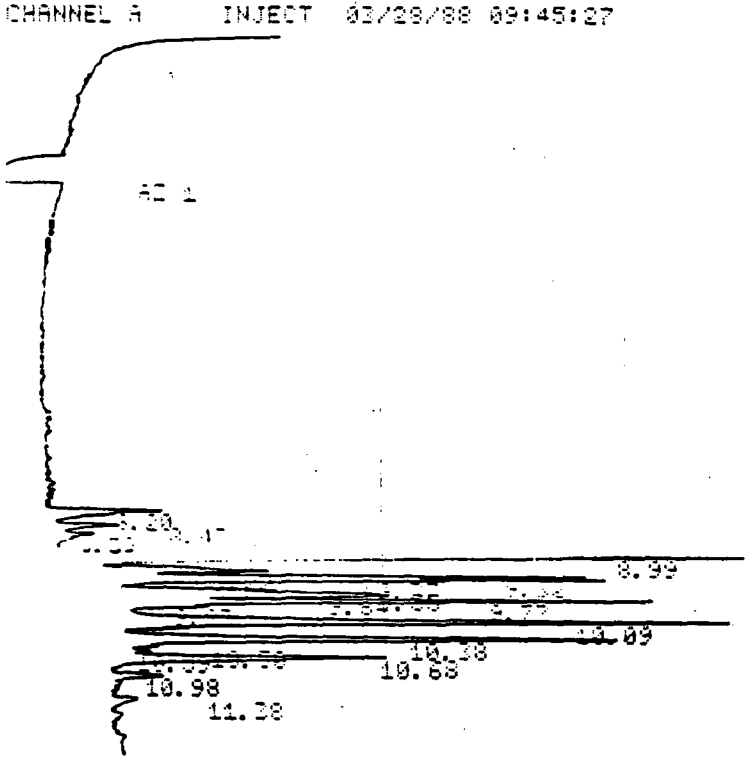
$\frac{3376}{16847} \times 2.27 \times \frac{0.5}{10} = .0227$ ug/ml

$.0227 \times 0.25 = .005686 \times \frac{10}{2} = .0284$ ug/2.17g

$.0284 \times \frac{1000}{2.17} \div 1000 = .013$ mg/kg

Aroclor 1254

CHANNEL A INJECT 03/28/88 09:45:27



03/28/88 09:45:27 CH= "A" PS= 1.

FILE 1. METHOD 0. RUN 9 INDEX 9

PEAK#	AREA%	RT	AREA	BC
1	2.245	8.2	949	02 ✓
2	1.209	8.43	511	02 ✓
3	0.885	8.59	374	03
4	16.902	8.99	7145	02
5	[illegible]	9.22	1959	02
6	6.047	9.32	2556	02
7	8.644	9.37	3654	02 ✓
8	2.089	9.55	883	02
9	8.036	9.64	3397	02
10	9.517	9.73	4023	02
11	2.122	9.83	897	02
12	16.668	10.09	7046	02 ✓
13	11.088	10.38	4687	02 ✓
14	0.866	10.5	366	02
15	0.809	10.59	342	02
16	6.394	10.68	2703	02
17	1.256	10.98	531	03
18	0.589	11.38	249	01

TOTAL 100. 42272

Bases for J-11529
X = 13193

Bases for J-11527

$\frac{16847}{42272} \times 100 = 39.85\%$

$.3985 \times 5.7 = 2.27$ ppm

Bases for J.11526
10 highest peaks

$\frac{38119}{42272} = 0.9018 \times 5.7 = 5.14$ ppm

7

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

PROJECT NO.: 88-105

LOCATION: Commerce St.

DATE: 3-17-88

SAMPLE DUE DATE:

TIME	SAMPLER	CONTAINERS	SAMPLE TYPE: GRAB	SAMPLE TYPE: COMPOSITE	SAMPLE TYPE: SOIL	SAMPLE TYPE: WATER	MRA SAMPLE NUMBER / LAB SAMPLE NUMBER	ANALYSIS REQUIRED: B/N/A extractables	ANALYSIS REQUIRED: Pest - PCB's	SPLIT (Y) (N)
1330	[redacted]	1		✓	✓		Composite 2	✓	✓	N
1330	[redacted]	1		✓	✓		Composite 4	✓	✓	N
1330	[redacted]	1		✓	✓		Composite 5A	✓	✓	N
1330	[redacted]	1		✓	✓		Composite 5B	✓	✓	N
1330	[redacted]	1		✓	✓		Composite 56C	✓	✓	N

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	SAMPLE CONDITIONS
M. Sample	3-17-88	1545	Cynthia L. Miller	3-17-88	3:50	

McBride-Ratcliff and Associates, Inc.
7220 LANGTRY • HOUSTON, TEXAS • 713/460-3766

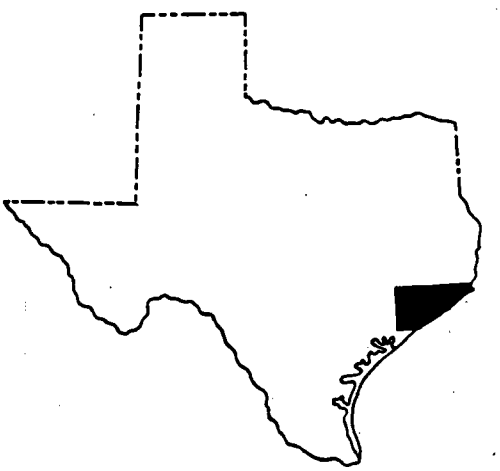
BUREAU OF ECONOMIC GEOLOGY
THE UNIVERSITY OF TEXAS AT AUSTIN
AUSTIN, TEXAS 78712

PETER T. FLAWN, *Director*

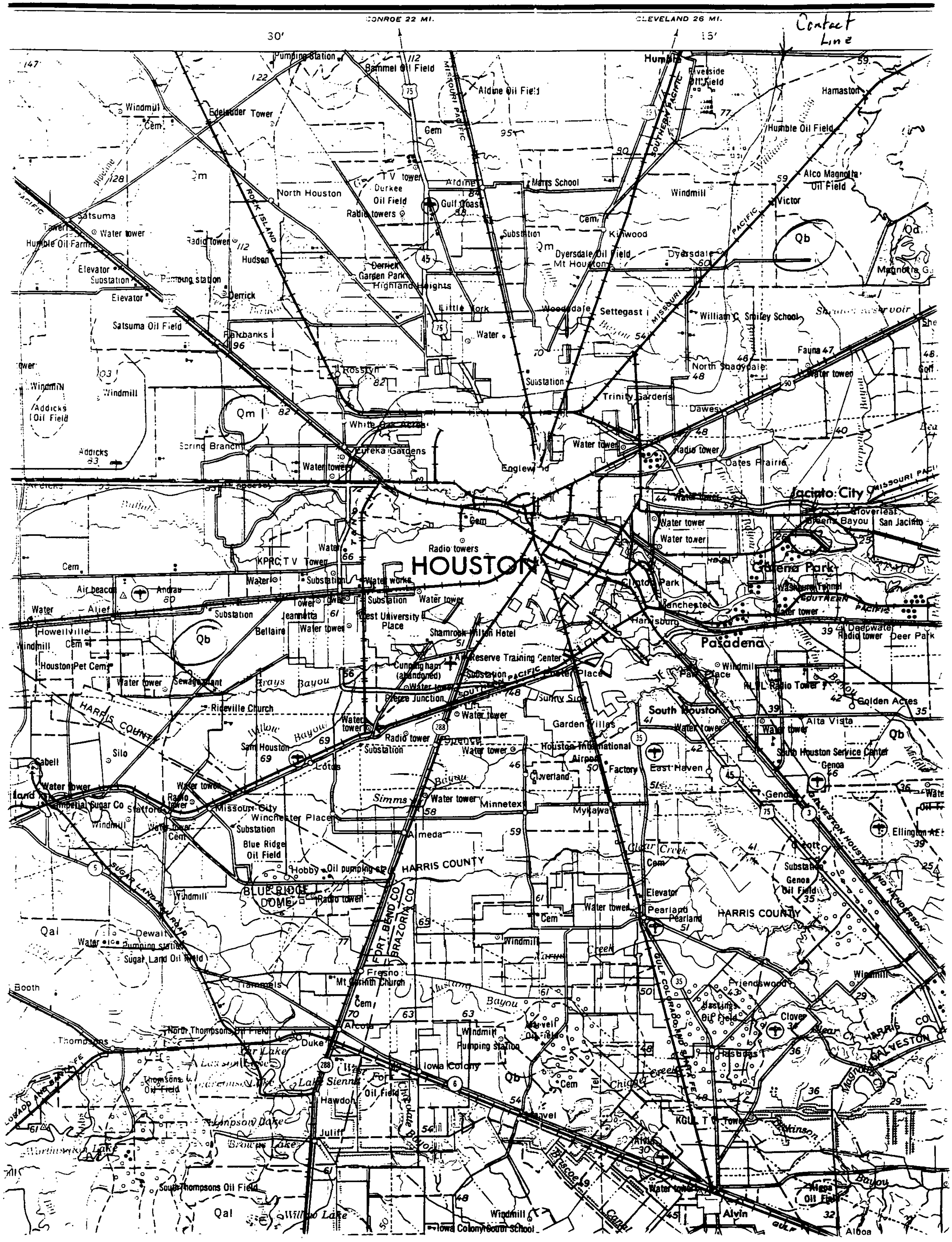
GEOLOGIC ATLAS OF TEXAS

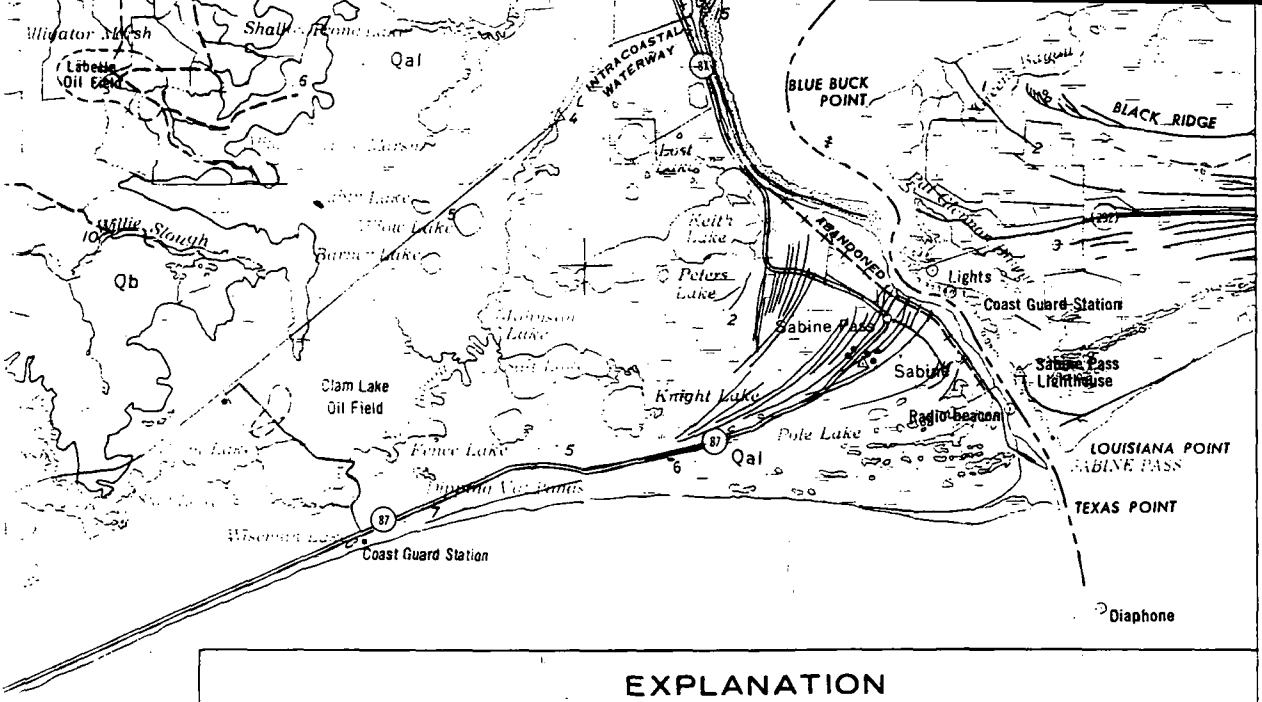
Houston Sheet

Scale: 1:250,000



February 1968


CONROE 22 MI.
CLEVELAND 26 MI.
30'
15'
Contact Line
HOUSTON
Humble
Pumping Station
Bammel Oil Field
Aldine Oil Field
Riverside Oil Field
Hamaston
Windmill
Edelsuder Tower
Gem
Humble Oil Field
North Houston
Durkee Oil Field
Gulf Coast
Aldine
Harris School
Alco Magnolia Oil Field
Victor
Satsuma
Water tower
Humble Oil Farm
Radio tower
Hudson
Substation
Kinwood
Dyersdale Oil Field
Mt Houston
Dyersdale
Elevator
Pumping station
Derrick
Garden Park
Highland Heights
Little York
Settegast
William C. Smiley School
Satsuma Oil Field
Fairbanks
Water
Fauna
North Shadydale
Rosslyn
Addicks Oil Field
Substation
Trinity Gardens
Dawes
White Oak Acres
Spring Branch
Eureka Gardens
Radio tower
Addicks
Oates Prairie
Englewood
Jacinto City
Cloverleaf
Greens Bayou
San Jacinto
Radio towers
KPRC T V Tower
Cem
Water works
Galena Park
Clinton Park
Washburn Tunnel
Air beacon
Andrau
Alief
Manchester
Howellville
Jeannetta
West University Place
Bellaire
Harrisburg
Deepwater
Radio tower
Deer Park
Pasadena
Houston Pet Cem
Shamrock-Hilton Hotel
Cunningham (abandoned)
Air Reserve Training Center
Foster Place
Park Place
Sewage plant
Brays Bayou
Pierce Junction
Sunny Side
South Houston
Golden Acres
Rideville Church
Garden Villas
Alta Vista
HARRIS COUNTY
Willow Bayou
Sam Houston
Spencer
Houston International Airport
South Houston Service Center
Silo
Lotus
Overland
Factory
East Haven
Genoa
Cabell
Imperial Sugar Co
Stafford
Missouri City
Winchester Place
Simms Bayou
Minnetex
Mykawa
Ellington AFB
Almeda
Blue Ridge Oil Field
Clear Creek
Hobby
Oil pumping sta
BLUE RIDGE DOME
Genoa Oil Field
Dewalt
Elevator
Pearland
Qal
Sugar Land Oil Field
SUGAR LAND RAILROAD
FORT BEND CO
BRAZORIA CO
Fresno
Mt Carmel Church
Friendswood
Booth
Tammels
Hastings Oil Field
Arcola
Mustang Bayou
Clover
North Thompsons Oil Field
Marvel Oil Field
Thompsons
Duke
Hastings
Iowa Colony
Thompsons Oil Field
Lake Sienna
Oil Field
Hawdon
Manvel
KGUL T V Tower
Juliff
Dickinson Bayou
Brown Lake
Alvin
South Thompsons Oil Field
Willow Lake
Iowa Colony School
Algoa Oil Field
Algoa
GULF COLORADO AND SANTA FE
GALVESTON HOUSTON AND HENDERSON
MISSOURI PACIFIC
SOUTHERN PACIFIC
ROCK ISLAND
HARRIS CO
GALVESTON CO



EXPLANATION

SEDIMENTARY ROCKS

Recent

Fs

Fill and spoil

Fill, F, material dredged for raising land surface above alluvium and barrier island deposits and for creating land. Spoil, S, dredged material forming islands along waterways

Qal

Alluvium

Clay, silt, and sand, organic matter abundant locally; includes point bar, natural levee, stream channel, backswamp, coastal marsh, mud flat, and narrow beach deposits, the last shown by line symbol

30'

Qbi

Barrier island deposits

Sand, silt, and clay; mostly sand, well sorted, fine grained, abundant shells and shell fragments; interfingers with clay and silt in landward direction; includes beach ridge, spit, tidal channel, tidal delta, and sand dune deposits.

Recent or Late(?) Pleistocene

Qd | Qd?

Deweyville Formation

Sand, silt, and clay, some gravel; includes point bar, natural levee, stream channel, and backswamp deposits at a level only slightly above that of the present flood plain; sand coarser than in alluvium; surface characterized by relict meanders of much larger radius of curvature than those of present streams, some scattered pimple mounds; thickness locally more than 50 feet. High level Deweyville surfaces cut in the Beaumont Formation and high level Deweyville deposits along Trinity River are intermediate in position between the Beaumont surface and the level of most Deweyville deposits

Qb | Qbb

Beaumont Formation

Beaumont Formation, Qb, with barrier island and beach deposits, Qbb, mapped separately. Beaumont Formation, Qb, mostly clay, silt, and sand; includes mainly stream channel, point bar, natural levee, and backswamp deposits and to a lesser extent coastal marsh and mud flat deposits; concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meander-belt ridges, separated by areas of low, relatively smooth, featureless backswamp deposits without pimple mounds; thickness 100± feet. Barrier island and beach deposits, Qbb, mostly fine-grained sand normally without shell material; surface slightly higher than that of surrounding deposits, characterized by numerous pimple mounds and rounded depressions; probably part of "Ingleside" barrier island system; thickness less than 50 feet. (Prairie Formation is a more recent name for deposits in Louisiana equivalent to Beaumont Formation in Texas)

QUATERNARY

Pleistocene

Qm

15'

Montgomery Formation

Clay, silt, sand, and very minor siliceous gravel of granule and small pebble size, gravel more abundant northwestward, locally calcareous, concretions of calcium carbonate, iron oxide, and iron-manganese oxides common in zone of weathering; fluviatile; surface fairly flat and featureless except for numerous rounded shallow depressions and pimple mounds; thickness 100± feet. (Upper part of Lissie Formation as previously mapped)

TEXAS WATER DEVELOPMENT BOARD

REFERENCE: 6

REPORT 190

ANALOG-MODEL STUDIES OF GROUND-WATER HYDROLOGY IN THE HOUSTON DISTRICT, TEXAS

By

Donald G. Jorgensen
U.S. Geological Survey

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Texas Water Development Board
and the City of Houston

February 1975

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the only significant relief is in the valleys of the streams. The land is generally treeless in the rural areas from Houston southeast to Galveston.

The climate of the Houston district is characterized by mild winters and hot summers. The lowest temperature recorded at Houston was 15°F (-9.5°C) and the maximum temperature was 108°F (42°C). The mean annual temperature is 69.2°F (20.6°C). The 30-year average (1931-60) rainfall at Houston was 45.95 inches (116.7 centimeters); monthly rainfall is distributed uniformly throughout the year.

The Houston district has a large and diversified industrial economy, but also has extensive agricultural developments. Large amounts of water are used by industry for processing and cooling purposes and by rice and cotton growers for irrigation. The rapid growth and development of the district are due in part to the availability of large amounts of inexpensive ground-water supplies. The locations of the major pumping areas are shown on Figure 2.

Previous Studies

Among the more comprehensive earlier reports describing the geology and hydrology of the Houston district is the report by Lang and others (1950). Pettit and Winslow (1957) summarized the geology and ground-water resources of Galveston County. The relation of salt water to fresh ground water in Harris County was discussed by Winslow and others (1957). Land-surface subsidence and its relation to the withdrawal of ground water in the Houston-Galveston area was first reported by Winslow and Doyel (1954) and later by Gabrysch (1969).

Previous ground-water investigations were made in Waller County (Wilson, 1967); Liberty County (Anders and others, 1968); Montgomery County (Popkin, 1971); Fort Bend County (Wesselman, 1972); Brazoria County (Sandeen and Wesselman, 1973); and Chambers County (Wesselman, 1971). These studies provided relatively recent data on the ground-water resources and ground-water development in most of the Houston district exclusive of Harris and Galveston Counties.

A report containing data on ground-water withdrawals and water-level declines in Galveston and Harris Counties was prepared by Gabrysch (1972), and the role of groundwater in the development of the water system for the city of Houston was described in reports by Turner, Collie and Braden, Inc. (1966, 1972).

A report by Wood and Gabrysch (1965) describes the results of the first analog-model study of ground-water hydrology in the Houston district. The usefulness of the first analog model was limited because the simulations required that the aquifers be operated independently of each other and because the results of pumping in the western part of the area could not be simulated. Evaluation of the performance of the first model indicated that improvement in aquifer designation was needed and that the transmissivity of the aquifers and vertical leakage between the aquifers were not adequately modeled.

Acknowledgments

The author expresses his appreciation to Mr. D. E. VanBuskirk of the city of Houston Water Department and to the well owners and drillers who supplied pertinent information for this study. The aquifers in the district were mapped by John Wesselman, U.S. Geological Survey, and the model was designed and constructed by William Bruns, U.S. Geological Survey.

GEOHYDROLOGY

The geologic formations from which most of the ground water is pumped in the Houston district are composed of sedimentary deposits of gravel, sand, silt, and clay. The formations, from oldest to youngest, that form important hydrologic units are: The Catahoula Sandstone and Fleming Formation of Miocene age; the Goliad Sand of Pliocene age; the Willis Sand, Bentley and Montgomery Formations, and Beaumont Clay of Pleistocene age; and alluvium of Quaternary age (Table 1). Correlation of the hydrologic units from northern Montgomery County to the Gulf of Mexico is shown by the chart on Figure 3.

With exception of the alluvium and the Goliad Sand, the formations crop out in belts that are nearly parallel to the shoreline of the Gulf of Mexico. The younger formations crop out nearer the Gulf and the older ones farther inland. All the formations thicken downdip so that the older formations dip more steeply than the younger ones. Locally, however, the occurence of salt domes and faults may cause reversals of the regional dip and thickening or thinning of individual beds.

Salt domes are cylindrical structures resulting from the upward movement of salt masses that are probably of Mesozoic age. In some areas, the salt domes penetrate the uppermost aquifer and nearly reach the surface. In

most instances, however, the domes pierce only the lower aquifers. Ground-water circulation within the vicinity of the domes may result in salt water contamination.

Faults in the area may have several hundred feet of displacement in the older Tertiary formations, but displacement tends to decrease upward so that the faulting may not be apparent at the surface; generally, the geologic units containing fresh water are not displaced enough to disrupt hydraulic continuity.

Description of the Water-Bearing Units

Chicot Aquifer

The Chicot aquifer is composed of the Willis Sand, Bentley Formation, Montgomery Formation, Beaumont Clay, and Quaternary alluvium (Table 1). The Chicot includes all deposits from the land surface to the top of the Evangeline aquifer (Figure 4).

The basis for separating the Chicot aquifer from the underlying Evangeline aquifer is primarily a difference in hydraulic conductivity, which in part causes the difference in the altitudes of the potentiometric surfaces in the two aquifers.

In most of the Houston district, the Chicot aquifer consists of discontinuous layers of sand and clay of about equal total thickness, and in some parts of the district, the aquifer can be separated into an upper and lower unit. Throughout most of Galveston County and southeast Harris County, the basal part of the lower Chicot aquifer is formed by a massive sand section with high hydraulic conductivity. (See Figure 4.) This sand unit, which is heavily pumped, is known locally as the Alta Loma Sand. In many previous reports, the unit is identified as the Alta Loma Sand of Rose (1943). The term Alta Loma Sand is not often used in this report because the stratigraphic relationships are not clear.

If the upper unit of the Chicot aquifer cannot be defined in a particular area, the aquifer is said to be undifferentiated. The areal extent of the upper unit roughly corresponds to the areal extent of the Beaumont Clay. The areas in which the aquifer cannot be differentiated into units are mostly in the northern part of the district (Figure 5).

Wells that are completed in the uppermost sand layers of the Chicot aquifer and that have water levels that are distinctly higher than water levels in wells completed in the underlying sand layers are considered to produce water from the upper unit.

The transmissivity of the Chicot aquifer ranges from zero to about 20,000 ft^2/day (feet squared per day) or 1,858 m^2/day (meters squared per day). The storage coefficient ranges from 0.0004 to 0.20 (Figure 6). The larger values of the storage coefficient occurs in the northern part of the district where the aquifer is partly or totally under water-table conditions.

Evangeline Aquifer

The Evangeline aquifer, which is the most important source of fresh ground water in the Houston metropolitan area, consists of layers of sand and clay that are present throughout the district except where the unit is pierced by salt domes (Figure 7). The aquifer is underlain by the Burkeville confining layer.

The transmissivity of the Evangeline aquifer ranges from less than 5,000 ft^2/day (460 m^2/day) to about 15,000 ft^2/day (1,400 m^2/day). (See Figure 8.) In general, the horizontal hydraulic conductivity of the Evangeline aquifer is less than the horizontal hydraulic conductivity of the Chicot aquifer, but because the Evangeline is generally thicker than the Chicot, it is generally more transmissive.

The storage coefficient of the Evangeline ranges from about 0.0005 to 0.0002 where it occurs under artesian conditions; in the outcrop area, where the aquifer is under water-table conditions, the storage coefficient ranges from greater than 0.002 to 0.20.

Burkeville Confining Layer

The Burkeville confining layer, which in the outcrop area is in the upper part of the Fleming Formation of Tertiary age, is composed mostly of clay but contains some layers of sand. The Burkeville restricts the flow of water except where it is pierced by salt domes and in the northeastern part of the district where it contains many water-yielding sand layers. The Burkeville is underlain by the Jasper aquifer.

Declines in the Altitudes of the Potentiometric Surfaces

Records of ground-water withdrawals in the Houston district date back to 1887, and records exist for probably 90 percent of the total withdrawals.

REFERENCE: 7

RECORD OF COMMUNICATION	(Record of Item Checked Below) _✓_ Phone Call ___ Discussion ___ Field Trip ___ Conference ___ Other(Specify)	
To: Jim Bell*	**From:** Michael N. Mitchell FIT Geologist M.N.M.	**Date:** 1-17-91 **Time:** 8:50 a.m.

SUBJECT: Current Ground Water Production - City of Houston (TXD981918188)

SUMMARY OF COMMUNICATION

I called Mr. Bell to determine how much of the City of Houston's water supply is from ground water and surface water. Mr. Bell told me that an average of 350 million gallons per day are provided by ground water from wells, and that 360 million gallons per day are supplied by surface water from Lake Houston. Ground water supplies approximately 50% of total supply. Attached is a list of City of Houston producton wells.

*Jim Bell, Production Technician, Ground Water Section Public Works Department, City of Houston, 105 Sabine Street (713) 223-0181

CONCLUSIONS, ACTION TAKEN OR REQUIRED

INFORMATION COPIES TO:

EPA FORM 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 which may be used until Supply is Exhausted.

WELL	CASING SIZE (in.)	CASING DEPTH (ft.)	LINER SIZE (in.)	LINER DEPTH (ft.)	SCREEN DEPTH (ft.)	CAPACITY G.P.M.
ACRES HOMES #1	24	638	14	606 - 1512	645 - 1497	2000
ACRES HOMES #2	24	620	14	568 - 890	624 - 890	1050
ACRES HOMES #2SB	24	317	18	0 - 620	322 - 600	1800
ACRES HOMES #3	24	610	14	586 - 1654	612 - 1644	2100
ACRES HOMES #4	24	635	14	576 - 1706	656 - 1697	1250
ACRES HOMES #5	24	600	14	545 - 1480	601 - 1470	1150
AFTON VILLAGE	24	602	12	573 - 1634	680 - 1633	1950
ALIEF (D-78)	14	440	8	340 - 710	461 - 710	500
ARBOR OAKS	10	425	6	325 - 560	460 - 545	350
ASHFORD FOREST (D-95) #1	16	610	10	507 - 895	640 - 880	1475
ASHFORD FOREST (D-95) #2	16	900	10	800 - 1225	906 - 1206	1000
ASHFORD POINT (D-218) #1	20	700	14/12	600 - 1610	700 - 1580	2000
ASHFORD POINT (D-218) #2	20	685	12	585 - 1122	692 - 1102	1200
BARKERS LANDING (MWMUD-1) #1	8	570	4	470 - 716	580 - 706	180
BARKERS LANDING (MWMUD-1) #2	16	760	10	660 - 995	770 - 993	900
BARKERS NORTH (MWMUD-2) #3	24	630	18	530 - 1288	636 - 1268	1600
BELLAIRE BRAES #1	24/20	620	14	590 - 1630	635 - 1616	1950
BELLAIRE BRAES #2	24	650	14	578 - 1545	668 - 1545	2000
BELLAIRE BRAES #3	24	605	18/14/10	566 - 1450	620 - 1450	2100
BELLAIRE BRAES #4	24	608	14	537 - 1650	618 - 1634	2200
BELLAIRE BRAES #5	24	634	14	617 - 1550	646 - 1550	2100
BELLAIRE INDEPENDENT (D-158) #1	24	687	18/14	591 - 1387	687 - 1367	2200
BELLAIRE INDEPENDENT (D-158) #2	24	670	18/14	569 - 1385	683 - 1370	2000
BELLAIRE INDEPENDENT (D-158) #3	24	590	18/14	488 - 1320	599 - 1300	2000
BELLEAU WOODS #1	16	175	10	0 - 355	185 - 343	100
BELLEAU WOODS #2	4	538	2	554 - 586	554 - 572	50
BELLFORT	24/20	510	14	455 - 1197	515 - 1197	1800
BENBROOK (EASTEX OAKS-2) #2	14	895	8	793 - 1157	903 - 1143	800
BOONE ROAD	12	690	6	591 - 900	706 - 889	525
BRAEBURN VALLEY (D-55) #2	16	870	10	766 - 1311	876 - 1300	900
BRAEBURN WEST	16	615	10	518 - 955	627 - 942	1100
BRAESWOOD #1	24	610	14	568 - 1714	684 - 1690	2300
BRAESWOOD #2	24	800	14/8	536 - 1301	620 - 1292	1800
BRAYS VILLAGE (D-51) #1	20	660	12	580 - 1070	669 - 1070	1350
BRAYS VILLAGE (D-51) #2	20	1135	12	1032 - 1599	1138 - 1594	1400
BRIARGROVE	20	455	12/10	354 - 751	467 - 732	300
BRIAR VILLAGE (WESTHEIMER MUD)	16	850	10	750 - 1190	860 - 1170	1000
BRIARWICK #1	14	725	8	524 - 912	636 - 900	500
BRIARWICK #2	16	955	10	855 - 1230	967 - 1220	1000
BROOKFIELD	16	570	6	463 - 872	580 - 866	750
CANDLELIGHT FOREST #1						
CANDLELIGHT OAKS (D-112)	16	780	10	693 - 1140	806 - 1118	750
CENTRAL #19	24	627	13/12	585 - 1971	1160 - 1960	2200
CENTRAL #20	24	600	12	567 - 1920	1015 - 1910	1850
CENTRAL #21	24/20	606	12	574 - 1990	747 - 1990	1500
CENTRAL #22	24	596	14	527 - 1640	701 - 1630	1800
CHASEWOOD #1	14	760	8	668 - 1045	792 - 1045	1040
CHASEWOOD #2	18	740	12	648 - 1215	758 - 1213	1750
CHASEWOOD #3	18	740	12	641 - 1190	752 - 1171	1800
CONCOURSE (D-184)	20	720	12	652 - 1487	730 - 1472	1900
CROWN COLONY (D-104)	16	700	10	600 - 842	712 - 832	900

WELL	CASING SIZE (in.)	CASING DEPTH (ft.)	LINER SIZE (in.)	LINER DEPTH (ft.)	SCREEN DEPTH (ft.)	CAPACITY G.P.M.
EAST END #3	24	581	12	546 - 2368	1195 - 2345	2100
EAST END #4	24	606	12	506 - 2530	1001 - 2510	2500
EAST END #7	24	610	12	576 - 1770	785 - 1755	2250
EASTEX OAKS - 3 #1	12	435	6	328 - 600	440 - 595	400
EASTEX OAKS - 3 #2	10	594	6	484 - 762	598 - 750	300
EASTEX OAKS - 3 #3	16	625	10	549 - 1120	631 - 1100	500
EISENHOWER PARK	8	350	6	340 - 538	350 - 535	250
ELLINGTON #1	12	448	6	438 - 583	465 - 571	650
ELLINGTON #2	12	459	6	449 - 558	467 - 547	600
FAIRDALE #1A	24	644	10/14	540 - 1929	645 - 1932	2100
FAIRDALE #1SB	24	344	10	0 - 575	344 - 570	1600
FLEETWOOD (D-10) #1	16	730	10	632 - 1140	737 - 1134	1000
FORUM PARK (D-139)	16	740	10	641 - 1030	752 - 1017	650
GLENSHIRE #1	14	630	8	528 - 870	638 - 867	1000
GLENSHIRE #2	14	650	8	540 - 888	658 - 878	800
GREENS BAYOU (D-32) #2	14	580	7	470 - 852	583 - 840	400
HEIGHTS #6A	24	655	10/14	555 - 1467	675 - 1459	2300
HEIGHTS #7A	24	695	10/14	619 - 1472	702 - 1454	2100
HEIGHTS #9	24	600	12	502 - 1730	610 - 1710	2000
HEIGHTS #10	24	590	12	538 - 1880	600 - 1860	1675
HEIGHTS #11A	24	702	10/14	629 - 1310	717 - 1298	1850
HEIGHTS #12	20	588	16/12	577 - 1772	900 - 1750	1400
HEIGHTS #13	24	606	12	566 - 1820	890 - 1800	1400
HEIGHTS #15A	24	665	10/14	589 - 1675	682 - 1532	2100
HEIGHTS #15SB	24	320	10	0 - 650	330 - 635	1500
HEIGHTS #16	24	590	16/12	564 - 1844	604 - 1844	1600
HIDDEN ECHO (D-82) #1	6	518	4	518 - 570	523 - 570	40
HIDDEN ECHO (D-82) #2	6	450	4	450 - 503	450 - 500	70
HOBBY	24	595	16/12	333 - 1850	820 - 1830	1850
HUNTINGTON VILLAGE (D-111) #1	16	685	10	580 - 1187	696 - 1175	1100
HUNTINGTON VILLAGE (D-111) #2	16	600	10	505 - 1000	615 - 990	1225
IMPERIAL POINT (D-94) #1	16	510	10	415 - 825	535 - 810	650
IMPERIAL POINT (D-94) #2	18	680	12	649 - 1370	844 - 1370	850
IMPERIAL VALLEY #1	14	800	8	701 - 1112	806 - 1095	950
IMPERIAL VALLEY #2	20	760	12	650 - 1490	844 - 1480	800
INTERCONTINENTAL #1	24	616	12	516 - 1521	641 - 1507	2000
INTERCONTINENTAL #2	24	600	12	519 - 1550	667 - 1549	2300
INTERCONTINENTAL #3	24	610	14	550 - 1630	645 - 1615	2000
INWOOD FOREST (D-93) #1	16	900	10	804 - 1150	916 - 1133	975
INWOOD FOREST (D-93) #2	16	690	10	605 - 1095	705 - 1085	-
JERSEY VILLAGE #1	24	550	10/14	450 - 1485	560 - 1470	1400
JERSEY VILLAGE #2	24	497	10/14	0 - 1480	480 - 1460	1825
JERSEY VILLAGE #3	24	595	10/14	0 - 1514	604 - 1494	1775
JERSEY VILLAGE #4	24	840	10	740 - 1444	846 - 1424	1775
JERSEY VILLAGE #5	24	820	10	720 - 1438	825 - 1418	1425
JERSEY VILLAGE #6	24	570	10/14	470 - 1080	580 - 1066	1550
JERSEY VILLAGE #7						
JERSEY VILLAGE #8						
KATY ADDICKS #1	24	610	14	536 - 1570	660 - 1560	2000
KATY ADDICKS #2	24	553	14	502 - 1130	561 - 1116	2150
KATY ADDICKS #3	24	580	14	531 - 1126	589 - 1120	2000

WELL	CASING SIZE (in.)	CASING DEPTH (ft.)	LINER SIZE (in.)	LINER DEPTH (ft.)	SCREEN DEPTH (ft.)	CAPACITY G.P.M.
KATY ADDICKS #5	24	590	14	530 - 1670	598 - 1670	1425
KATY ADDICKS #6	24	695	18/14	597 - 1155	708 - 1151	1900
KATY ADDICKS #7	24	685	18/14	587 - 1573	697 - 1558	1600
KATY ADDICKS #8 •	24	670	18/14	563 - 1029	674 - 1027	-
KATY ADDICKS #9	24	820	18/14	723 - 1530	837 - 1512	1800
KATY ADDICKS #10	24	625	18/14	525 - 1200	634 - 1184	1875
KATY ADDICKS #11	24	680	18/14	580 - 1712	685 - 1692	1900
KEEGANS GLEN (D-123) #1	16	700	10	600 - 1044	715 - 1034	1025
KEEGANS GLEN (D-123) #2	16	710	10	620 - 1012	720 - 992	1350
KIRKMONT (D-81)	18	850	10	747 - 1210	860 - 1195	1000
KIRKWOOD (D-90) #1	16	695	10	595 - 945	714 - 934	600
KIRKWOOD (D-90) #2	16	690	10	609 - 964	700 - 960	1075
LAKESIDE PLACE (D-71) #1	18	1045	12	954 - 1367	1064 - 1361	1150
LAKESIDE PLACE (D-71) #2	16	985	10	891 - 1450	1002 - 1442	800
LAKESIDE PLACE (D-71) #2	18	590	12	551 - 975	603 - 965	1600
LAKEWOOD HEIGHTS (D-73) #1	6	324	4	326 - 369	326 - 367	100
LAKEWOOD HEIGHTS (D-73) #2	8	520	6	522 - 639	522 - 637	100
LAKEWOOD HEIGHTS (D-73) #3	16	730	10	630 - 1010	740 - 1000	800
LINKWOOD #1	24	605	12	499 - 1520	764 - 1502	1500
LINKWOOD #2 •	24	604	12	571 - 2269	730 - 2251	-
LINKWOOD #3	24	608	20/10/14	572 - 1855	742 - 1852	2050
LITTLE YORK	16	725	10	623 - 1000	735 - 984	950
MANNING #1	16	515	10	415 - 954	480 - 936	550
MANNING #2	16	1130	10	1030 - 1450	1146 - 1440	950
MAYFAIR PARK	14	726	10/8	597 - 848	729 - 839	500
MELROSE PARK #1						30
MELROSE PARK #2						165
MEMORIAL WEST #1 •	16	900	10	797 - 1302	906 - 1287	-
MEMORIAL WEST #2	16	801	10	478 - 782	812 - 782	800
MEYERLAND #1	24	616	12	516 - 1492	704 - 1483	1050
MEYERLAND #2 •	18	600	10	498 - 1180	619 - 1180	-
NORTHBOROUGH #1 •	18	680	12	580 - 1330	690 - 1310	-
NORTHBOROUGH #2	20	620	12	514 - 1209	620 - 1206	1750
NORTHBOROUGH #3	24	536	18	0 - 800	544 - 790	1650
NORTHEAST #4	24	610	18/16/12	570 - 2080	1030 - 2060	2150
NORTHEAST #5	24	625	12	590 - 1980	1060 - 1960	1950
NORTHEAST #6	24	628	12	526 - 1794	1016 - 1794	2100
NORTHEAST #7	24	605	12	555 - 1883	1000 - 1873	1825
NORTHEAST #8	24	603	12	503 - 1846	1020 - 1846	1700
NORTHEAST #9	24	601	12	500 - 1923	1017 - 1919	1750
NORTHEAST #10 •	24	609	16/12	502 - 1846	698 - 1825	-
NORTHEAST #11	24	616	12	577 - 1819	741 - 1775	2100
NORTHGATE #1	20	720	10	640 - 1082	730 - 1060	1100
NORTHGATE #2	20	710	12	614 - 1459	725 - 1444	2100
NORTHPOINT (GREENS PUD) #1	18	622	12	518 - 1440	631 - 1437	1800
NORTHPOINT (GREENS PUD) #2	24	660	16/14	560 - 1475	672 - 1463	2250
NORTHWOOD MANOR (D-69) #1	16	691	8	594 - 1111	699 - 1086	550
NORTHWOOD MANOR (D-69) #2	16	590	8	495 - 1136	680 - 1128	950
PARKGLEN #1	16	730	10	634 - 1030	739 - 998	715
PARKGLEN #2	16	795	10	701 - 1142	806 - 1125	1025
PARKGLEN WEST	16	744	10	640 - 1129	770 - 1107	1000

GROUND WATER PRODUCTION STATUS

WELL	CASING SIZE (in.)	CASING DEPTH (ft.)	LINER SIZE (in.)	LINER DEPTH (ft.)	SCREEN DEPTH (ft.)	CAPACITY G.P.M.
RIDGEMONT #1	14	753	8	644 - 1050	766 - 1035	700
RIDGEMONT #2	18	640	12	537 - 1230	657 - 1216	1400
ROSEWOOD #1	16	970	10	870 - 1300	980 - 1280	525
ROSEWOOD #2	16	812	10	712 - 1288	823 - 1278	875
ROSEWOOD #3	24	960	18/14	859 - 1340	971 - 1323	2025
SAGEMONT #2	14	690	8	610 - 1135	700 - 1120	900
SCENIC WOODS (D-42) #2	16	600	8/4	489 - 835	605 - 820	525
SCENIC WOODS (D-42) #3	16	600	8/4	497 - 873	600 - 870	450
SCOTT STREET #6	24	570	12	504 - 2160	580 - 2140	2675
SHADOW OAKS	14	410	8	359 - 649	410 - 640	485
SHARPSTOWN #1	18	585	6	482 - 972	597 - 965	750
SHARPSTOWN #2	18	575	10	482 - 1000	584 - 990	675
SHARPSTOWN #3A	24	906	18/14	806 - 1541	910 - 1521	2225
SHARPSTOWN #4	24	570	12	510 - 1510	579 - 1495	2050
SHERWOOD OAKS #2	16	288	10	210 - 452	300 - 440	350
SIMS BAYOU #1	24	650	10	581 - 1270	659 - 1254	1760
SIMS BAYOU #2	24	636	14	559 - 1180	646 - 1168	1680
SIMS BAYOU #3	24	625	14	542 - 1204	632 - 1182	2100
SIMS BAYOU #4	24	644	14	557 - 1186	646 - 1186	1950
SIMS BAYOU #5 *	24	600	20/14	261 - 1050	610 - 1050	-
SIMS BAYOU #6	24	653	14	578 - 1200	656 - 1182	2100
SOUTHEAST WATER PLANT	4	-	-	- 400	-	30
SOUTH END #8	24	599	12	559 - 1496	610 - 1425	1475
SOUTH END #9	24	510	12	507 - 1797	676 - 1787	1975
SOUTH END #10	24	595	18/12	0 - 2170	783 - 2134	1800
SOUTH END #13	24	710	14	602 - 1787	718 - 1772	2230
SOUTHMONT (D-41) #2	24	600	14	499 - 1385	610 - 1370	2060
SOUTHPARK #4 *	18	600	10	560 - 1810	970 - 1790	-
SOUTHPARK #5	24	603	12	501 - 1840	755 - 1820	2000
SOUTHWEST #1A	24	708	18/14	613 - 1395	716 - 1395	2150
SOUTHWEST #3A	24	688	18/14	613 - 1505	699 - 1494	2250
SOUTHWEST #3SB	24	322	18	0 - 646	330 - 631	1900
SOUTHWEST #4A	24	685	18/14	585 - 1518	690 - 1498	2000
SOUTHWEST #5A	24	642	18/14	542 - 1397	652 - 1380	1740
SOUTHWEST #6A	24	748	18/14	648 - 1196	758 - 1176	2050
SOUTHWEST #7	24	480	18/12	0 - 1358	485 - 1336	1185
SOUTHWEST #8	24	510	12	489 - 1469	560 - 1445	1650
SOUTHWEST #9	24	513	12	483 - 900	520 - 900	1850
SOUTHWEST #10	24	600	12	576 - 1920	1071 - 1920	1850
SOUTHWEST #11	24	542	12	509 - 1425	746 - 1415	950
SOUTHWEST #12 *	24	600	12	555 - 1600	620 - 1575	-
SPRING BRANCH #1	24	585	8	533 - 1420	613 - 1420	800
SPRING BRANCH #1SB	24	380	16	0 - 740	385 - 720	Not Completed
SPRING BRANCH #2	24	580	12	546 - 1420	630 - 1420	1850
SPRING BRANCH #3A	24	780	18/14	680 - 1462	792 - 1440	Not Completed
SPRING BRANCH #4	24	590	14	541 - 1486	611 - 1472	1875
SPRING BRANCH #5	24	615	14	553 - 1540	665 - 1522	2000
TURKEY CREEK #2 *	16	715	10	617 - 1006	728 - 998	-
WALNUT BEND (D-50) #2 *	16	650	6	540 - 1300	668 - 1275	-
WESTBRIAR (D-54) #2A *	24	610	14	601 - 1324	639 - 1324	-
WESTBRIAR (D-54) #3A	24	650	14	629 - 1432	664 - 1421	1950

65,820

GROUND WATER PRODUCTION STATUS

WELL	CASING SIZE (in.)	CASING DEPTH (ft.)	LINER SIZE (in.)	LINER DEPTH (ft.)	SCREEN DEPTH (ft.)	CAPACITY G.P.M.
WESTBURY #1	20	1050	10	953 - 1735	1077 - 1724	1600
WESTBURY #3	24	570	12	498 - 1645	650 - 1645	2225
WESTCHASE (D-52) #1 *	14	575	6/8	469 - 870	586 - 860	-
WEST HOLLOW PARK (D-98)	16	615	10	515 - 1066	625 - 1056	700
WEST HOUSTON #1	16	475	12	375 - 800	475 - 790	1250
WEST HOUSTON #2	24	636	18/14	586 - 1314	660 - 1294	2700
WEST HOUSTON #3	24	703	18/14	603 - 1420	708 - 1400	2075
WEST LAKE PARK (D-21)	18	660	12	557 - 1170	674 - 1154	1650
WEST ROAD #1	14	660	8	559 - 870	670 - 861	450
WEST ROAD #2	16	890	10	789 - 1270	897 - 1264	725
WEST ROAD #3 *	18	680	12	580 - 1145	690 - 1130	-
WHITE OAK	16	710	10	622 - 958	728 - 951	600
WILLOW BEND	12	550	6	451 - 822	558 - 810	400
WILLOW MEADOWS *	12	551	6	449 - 810	557 - 798	-
WINDSWEPT *	24	650	18/14	542 - 1535	650 - 1508	-
WOODLAND TRAILS N. (D-15)	16	710	10	630 - 1070	715 - 1050	900
				Total		272,160

RECORD OF COMMUNICATION	(Record of Item Checked Below) ___Phone Call ___Discussion _✓_Field Trip ___Conference ___Other(Specify)	
To: Dana L. Barbie*	**From:** Michael N. Mitchell FIT Geologist M.N.M.	**Date:** 1-31-91 **Time:**

SUBJECT: Water Wells Within a Four Mile Radius of the Houston Gas Light Company Site (TXD981918188)

SUMMARY OF COMMUNICATION

I met with Mr. Barbie and requested information on the location and descriptions of water wells within a four mile radius of the Houston Gas Light Company site. I copied the locations of the wells onto 7.5 Minute U.S.G.S. Topographic Maps.

The nearest drinking water supply well is the City of Houston, Central 21 (65-13-905) which produces from the Evangeline aquifer between depths of 747 and 1,990 feet. Nine drinking water supply wells were located within the four mile radius and are listed below.

65-13-905 - Central 21, 65-13-904-Central 20

65-13-944 - Central 22, 65-22-103 - Scott Street

65-14-404 - Northeast 5, 65-14-405 - Northeast 4

65-21-302 - South end 8, 65-21-306 - South end 11

65-21-304 - Southwest 11

*Dana L. Barbie is a Hydrologist, United States Geological Survey, Water Resources Division, 2320 LaBranch, Houston, Texas

CONCLUSIONS, ACTION TAKEN OR REQUIRED

INFORMATION COPIES TO:

EPA FORM 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 which may be used until Supply is Exhausted.

REFERENCE: 9

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

HARRIS COUNTY, TEXAS AND INCORPORATED AREAS

PANEL 285 OF 390

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

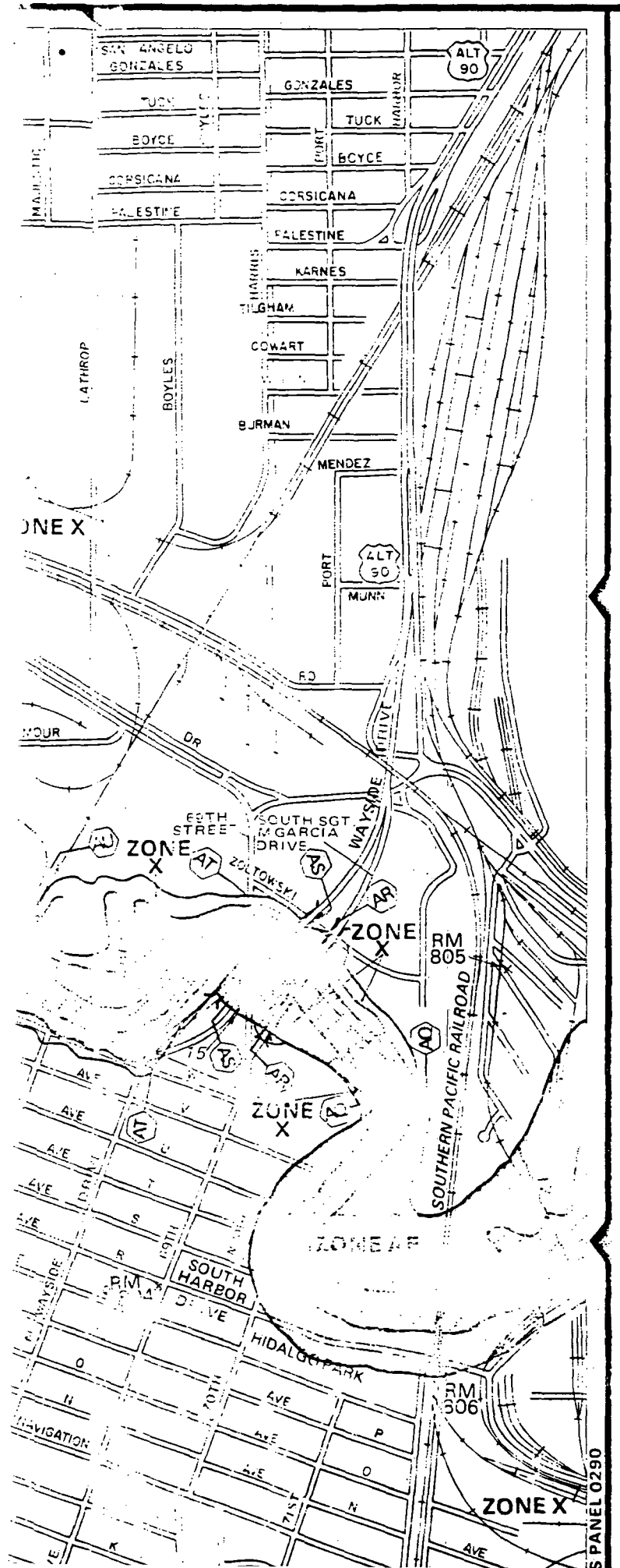
COMMUNITY	NUMBER	PANEL	SUFFIX
HOUSTON, CITY OF	480296	0285	G

MAP NUMBER

48201C0285 G

EFFECTIVE DATE:
SEPTEMBER 28, 1990

Federal Emergency Management Agency



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding; velocities also determined.

ZONE A99 To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.

ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X Areas determined to be outside 500-year floodplain.

ZONE D Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet*

D — D Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone*

$RM7_X$ Elevation Reference Mark

•M1.5 River Mile

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway


D
E
JOINS PANEL 0240
ZONE X
Site Location
PROVIDENCE
ROTHWELL
RM 793
STREET
NANCE
WILLIAM
CHAPMAN
HARDY
SEMMES
STERRETT
GRADY ST YARDS
GRAYSON
CLINE
PACIFIC
MEADOW
CLINTON
SYDNOR
ROANOKE
SHILOH
FOOTE
JENSEN
BAKER
BRAMBLE
LYLE
MAPLE
FRANKLIN
RUIZ
RUNNELS
LOTTMAN
RM 787
RM 789
RM 796
RM 791
RM 788
RM 795
RM 794
RM 797
CONGRESS
CHENEVERT
PRESTON
HAMILTON
CHARTRES
HUTCHINS
BASTROP
PRAIRIE
TEXAS
CAPITOL
RUSK
WALKER
HOUSTON BELT & TERMINAL RAILROAD
COLBY
SALTUS
DELANO
N PAIGE
ENNIS
PALMER
COMMERCE
BOULEVARD
ENGELKE
CARY
FOX
BERING
NAGLE
AUSTIN
CRAWFORD
CAROLINE
SAN JACINTO
HARRISBURG
ROBERTS
YORK
SHERMAN
KINNEY
LAMAR
DELANO
PAIGE
DALLAS
POLK
CLAY
BELL
JEFFERSON
ROBERTS
59

SEGMENT	DESCRIPTION
1014	Buffalo Bayou Above Tidal - from a point 100 meters (110 yards) downstream of Shepherd Drive in Harris County to SH 6 in Harris County
1015	Lake Creek - from the confluence with the West Fork San Jacinto River in Montgomery County to a pont 4.0 kilometers (2.5 miles) upstream of SH 30 in Grimes County
1101	Clear Creek Tidal - from the confluence with Clear Lake in Galveston/Harris County to a point 100 meters (110 yards) upstream of FM 528 in Galveston/Harris County
1102	Clear Creek Above Tidal - from a point 100 meters (110 yards) upstream of FM 528 in Galveston/Harris County to Rouen Road in Fort Bend County
1103	Dickinson Bayou Tidal - from the confluence with Dickinson Bay 2.1 kilometers (1.3 miles) downstream of SH 146 in Galveston County to a point 4.0 kilometers (2.5 miles) downstream of FM 517 in Galveston County
1104	Dickinson Bayou Above Tidal - from a point 4.0 kilometers (2.5 miles) downstream of FM 517 in Galveston County to FM 528 in Galveston County
1105	Bastrop Bayou Tidal - from the confluence with Bastrop Bay 1.1 kilometers (0.7 mile) downstream of the Intracoastal Waterway in Brazoria County to Old Clute Road at Lake Jackson in Brazoria County
1107	Chocolate Bayou Tidal - from the confluence with Chocolate Bay 1.4 kilometers (0.9 mile) downstream of FM 2004 in Brazoria County to a point 4.2 kilometers (2.6 miles) downstream of SH 35 in Brazoria County
1108	Chocolate Bayou Above Tidal - from a point 4.2 kilometers (2.6 miles) downstream of SH 35 in Brazoria County to SH 6 in Brazoria County
1109	Oyster Creek Tidal - from the confluence with the Intracoastal Waterway in Brazoria County to a point 100 meters (110 yards) upstream of FM 2004 in Brazoria County
1110	Oyster Creek Above Tidal - from a point 100 meters (110 yards) upstream of FM 2004 in Brazoria County to the Brazos River Authority diversion dam 1.8 kilometers (1.1 miles) upstream of SH 6 in Fort Bend County
1111	Old Brazos River Channel - from the confluence with the Intracoastal Waterway in Brazoria County to SH 288 in Brazoria County

REFERENCE: 10

TEXAS WATER COMMISSION
Rule Change

§§307.1-307.10
Texas Surface Water Quality Standards

Effective: April 29, 1988

1. Purpose. This change transmittal provides the pages that reflect changes and additions to the Texas Water Commission Volume of Permanent Rules.

2. Explanation of Change. The Texas Water Commission (TWC or commission) adopted the repeal of existing 31 Texas Administrative Code §§307.1-307.3 and new §§307.1-307.10. Section 307.1 and §307.2 were adopted without changes. Sections 307.3-307.10 were adopted with changes to the proposed text published in the October 9, 1987 issue of the Texas Register (12 TexReg 3642). The previous surface water quality standards were set forth in §§333.11-333.21 and §§307.1-307.3. The standards that appear in §§333.11-333.21 no longer exist under the terms of Senate Bill 249, 69th Legislature (1985) subsequent to the adoption of new §§307.1-307.10, which replace those previous Texas Water Development Board Rules. This adoption was published in the April 15, 1988 issue of the Texas Register (13 TexReg 1776).

TX

(33) Total suspended solids - Total suspended matter in water, which is equivalent to nonfiltrable residue.

(34) Total toxicity - Toxicity as determined by exposing aquatic organisms to samples or dilutions of instream water or treated effluent. Also referred to as whole-effluent toxicity.

(35) Toxicity - The occurrence of lethal or sublethal adverse effects on representative, sensitive organisms due to exposure to toxic materials. Adverse effects caused by conditions of temperature, dissolved oxygen, or nontoxic dissolved substances are excluded from the definition of toxicity.

(36) Toxicity biomonitoring - The determination of total toxicity.

(37) Water quality management program - The commission's overall program for attaining and maintaining water quality consistent with state standards, as authorized under the Texas Water Code, the Texas Administrative Code, and the Clean Water Act, §§106, 205(j), 208, 303(e) and 314 (33 United States Code 1251 et seq).

(38) Zone of initial dilution - The small area at the immediate point of discharge where initial dilution with receiving waters occurs, and which may not meet certain criteria applicable to the receiving water. A zone of initial dilution is substantially smaller than a mixing zone.

(b) Abbreviations. The following abbreviations apply to this chapter:

(1) AP - aquifer protection.

(2) BMP - best management practices.

(3) AS - agricultural water supply.

(4) CFR - Code of Federal Regulations.

(5) CR - contact recreation.

(6) CPP - continuing planning process.

(7) DO - dissolved oxygen.

(8) E - exceptional quality aquatic habitat.

(9) EPA - U.S. Environmental Protection Agency.

(10) °F - degree(s) Fahrenheit.

(11) ft^3/s - cubic feet per second.

(12) H - high quality aquatic habitat.

(13) I - intermediate quality aquatic habitat.

(14) IS - industrial water supply.

(15) L - limited quality aquatic habitat.

(16) mg/L - milligrams per liter

(17) ml - milliliter.

(18) N - navigation.

(19) NCR - noncontact recreation.

(20) NPDES - National Pollutant Discharge Elimination System, as set out in the Clean Water Act, §402 (33 United States Code 1342).

(21) O - Oyster waters.

(22) PQL - practical quantitation level.

(23) PS - public water supply.

(24) 7Q2 - seven-day, two-year low flow.

(25) TDS - total dissolved solids.

(26) USGS - U.S. Geological Survey.

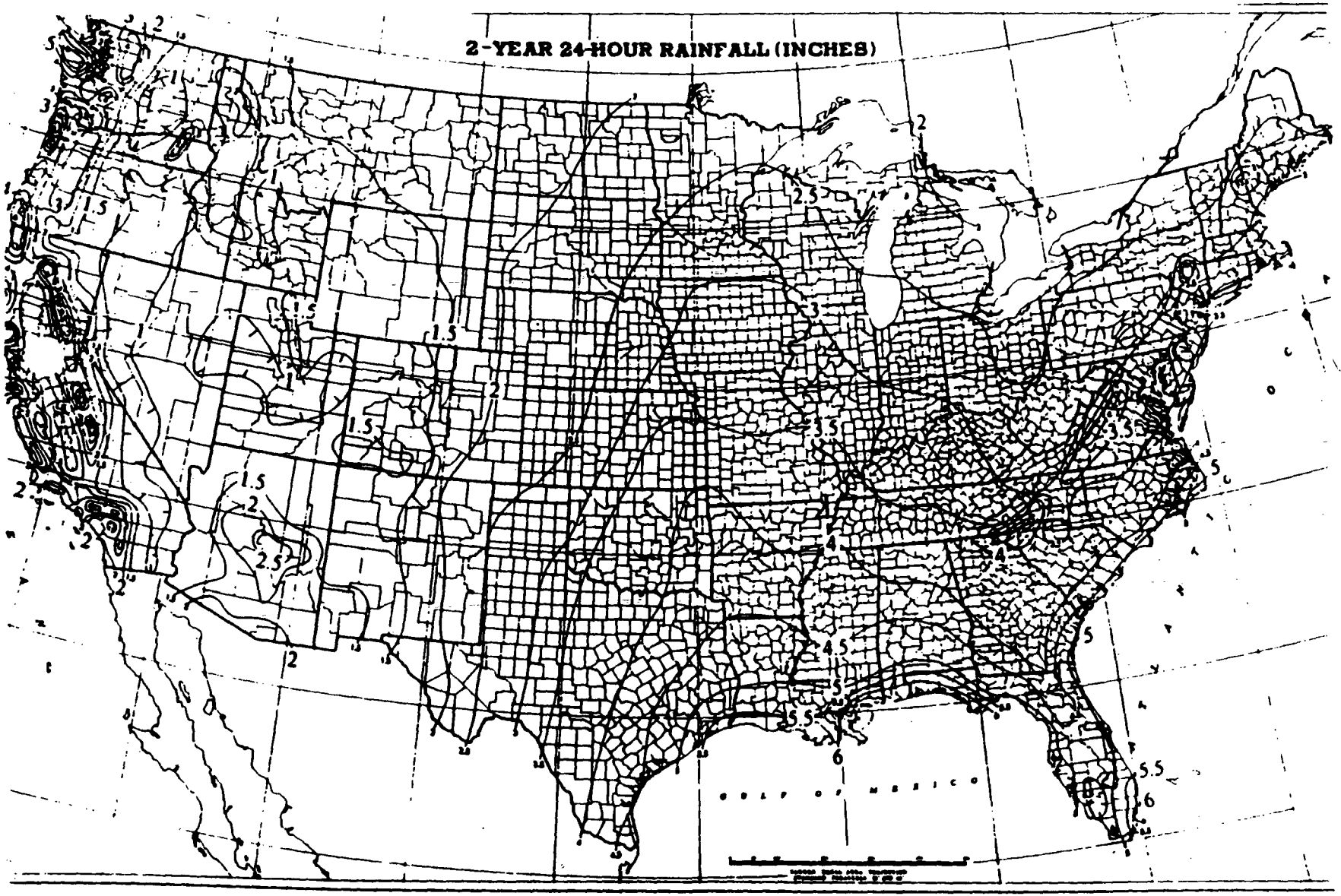
(27) WQM - water quality management.

SAN JACINTO RIVER BASIN		USES				CRITERIA						
SEGMENT NUMBER	SEGMENT NAME	RECREATION	AQUATIC LIFE	DOMESTIC WATER SUPPLY	OTHER	CHLORIDE (mg/L) Annual average not to exceed	SULFATE (mg/L) Annual average not to exceed	TOTAL DISSOLVED SOLIDS (mg/L) Annual average not to exceed	DISSOLVED OXYGEN (mg/L)	pH RANGE	FECAL COLIFORM (#/100 mL) Geometric mean not to exceed	TEMPERATURE (°F) Not to exceed
1001	San Jacinto River Tidal	CR	H						4.0	6.5-9.0	200	95
1002	Lake Houston	CR	H	PS		100	50	200	5.0	6.5-9.0	200	90
1003	East Fork San Jacinto River	CR	H	PS		80	40	400	5.0	6.0-8.5	200	91
1004	West Fork San Jacinto River	CR	H	PS		80	40	300	5.0	6.5-9.0	200	95
1005	Houston Ship Channel/San Jacinto River	NCR	H						4.0	6.5-9.0	200	95
1006	Houston Ship Channel				N/IS				2.0	6.5-9.0	2,000	95
1007	Houston Ship Channel/Buffalo Bayou				N/IS				1.0	6.5-9.0	2,000	95
1008	Spring Creek	CR	H	PS		80	40	300	5.0	6.5-9.0	200	90
1009	Cypress Creek	CR	H	PS		80	40	300	5.0	6.5-9.0	200	90
1010	Caney Creek	CR	H	PS		50	40	300	5.0	6.0-8.5	200	90
1011	Peach Creek	CR	H	PS		50	40	200	5.0	6.0-8.5	200	90
1012	Lake Conroe	CR	H	PS		50	40	200	5.0	6.5-9.0	200	90
1013	Buffalo Bayou Tidal	CR							2.0	6.5-9.0	200	92
1014	Buffalo Bayou Above Tidal	CR	L			110	65	600	3.0	6.5-9.0	200	92
1015	Lake Creek	CR	H	PS		80	20	300	5.0	6.0-8.5	200	90

SEGMENT	DESCRIPTION
1002	Lake Houston - from Lake Houston Dam in Harris County to the confluence of Spring Creek on the West Fork San Jacinto Arm in Harris/Montgomery County and to the confluence of Caney Creek on the East Fork San Jacinto Arm in Harris County, up to the normal pool elevation of 44.5 feet (impounds San Jacinto River)
1003	East Fork San Jacinto River - from the confluence of Caney Creek in Harris County to US 190 in Walker County
1004	West Fork San Jacinto River - from the confluence of Spring Creek in Harris/Montgomery County to Conroe Dam in Montgomery County
1005	Houston Ship Channel/San Jacinto River - from the confluence with Galveston Bay at Morgan's Point in Harris/Chambers County to a point 100 meters (110 yards) downstream of IH 10 in Harris County
1006	Houston Ship Channel - from the confluence with the San Jacinto River in Harris County to a point immediately upstream of Greens Bayou in Harris County, including tidal portions of tributaries
1007	Houston Ship Channel/Buffalo Bayou - from a point immediately upstream of Greens Bayou in Harris County to a point 100 meters (110 yards) upstream of US 59 in Harris County, including tidal portions of tributaries
1008	Spring Creek - from the confluence with the West Fork San Jacinto River in Harris/Montgomery County to the most upstream crossing of FM 1736 in Waller County
1009	Cypress Creek - from the confluence with Spring Creek in Harris County to the confluence of Snake Creek and Mound Creek in Waller County
1010	Caney Creek - from the confluence with the East Fork San Jacinto River in Harris County to SH 150 in Walker County
1011	Peach Creek - from the confluence with Caney Creek in Montgomery County to SH 150 in Walker County
1012	Lake Conroe - from Conroe Dam in Montgomery County up to the normal pool elevation of 201 feet (impounds West Fork San Jacinto River)
1013	Buffalo Bayou Tidal - from a point 100 meters (110 yards) upstream of US 59 in Harris County to a point 100 meters (110 yards) downstream of Shepherd Drive in Harris County

REFERENCE: 11

Herschfield, D.M., 1961, Rainfall Frequency Atlas of the United States. U.S. Weather Bureau Technical Paper No. 40.


2-YEAR 24-HOUR RAINFALL (INCHES)
MEXICO

Reference 12

I N T E R O F F I C E M E M O R A N D U M

TO: File

FROM: Michael N. Mitchell, FIT Geologist M.N.M.

DATE: December 9, 1990

SUBJECT: On-Site Reconnaissance

During the course of the on-site reconnaissance, it was learned ENTEX operates a natural gasmetering and distribution at the site. The area is commercial/light industrial. Runoff is diverted from the site by city storm water drainage system.

REFERENCE: 13

ARTEX

November 30, 1990

W. L. Clayton
Senior Vice President

Mr. Ed Sierra (FIT-RPO)
USEPA Region 6
Hazardous Waste Section (6E-SH)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Dear Mr. Sierra:

Attached is the "Consent for Access to Property" form for the Houston Gas Light Company site at 1515 Commerce, Houston, Harris County, Texas. I have revised the form to indicate my name and title so that future communications can be expedited.

Yours very truly,

WLC:gs

Attachment

1600 Smith Street • P. O. Box 2628 • Houston, Texas 77252-2628 • 713 / 654-5555
A Division of Arkla, Inc.

CONSENT FOR ACCESS TO PROPERTY

Name: William L. Clayton, Senior Vice President, Entex, P. O. Box 2628, Houston, TX 77252-2628

Houston Gas Light Company Site at 1515 Commerce, Houston, Harris County, Texas.

I hereby consent to Ecology and Environment, Inc. and/or their subcontractor, ICF Kaiser Engineers, duly authorized consultants of the United States Environmental Protection Agency (EPA) entering and having continued access to the property described above for the following purposes:

1. Reviewing and copying documents related to Houston Gas Light Company;

2. The collection of soil, water, and air samples;

3. The sampling of any solids or liquids stored or disposed on the property;

4. The drilling of holes and installation of monitoring wells for subsurface investigations;

5. Other actions related to the investigation of surface and subsurface contamination.

I realize that these actions are undertaken pursuant to EPA's response and enforcement responsibilities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. Sections 9601-9626; and the Resource Conservation and Recovery Act (RCRA), 42 USC Section 6297.

I am the property owner, or a responsible official of the property owner, and I warrant that I have the authority to make this access agreement.

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

11/30/90
Date

W. L. Clayton
Signature

Place a check mark in the appropriate space. Please note that if no space is marked EPA will treat your failure to mark a space as your statement that you do not wish to be provided with a portion of each sample.

(✓) Please provide me with a portion of each sample taken at the property described above. (There is no charge for the sample portions EPA provides you).

( ) I do not wish to be provided with a portion of each sample taken at the property described above.

LEGEND

ROAD CLASSIFICATION

Heavy-duty — Light-duty

Medium-duty — Unimproved dirt

Interstate Route · U. S. Route · State Route

REFERENCE: 14

ecology & environment, inc.	Site Name: Houston Gas Light Company Location: Houston, Texas Site ID: TXD981918188

USGS TOPOGRAPHIC MAPS

Quadrangle Location

Name: Houston Heights, Tx. Date: 1982 Revised: Contour Interval: 5'	Name: Settegast, Tx. Date: 1982 Revised: Contour Interval: 5'
Name: Bellaire, Tx. Date: 1982 Revised: Contour Interval: 5'	Name: Park Place, Tx. Date: 1982 Revised: Contour Interval: 5'

1 1/2 0 1 Mile

ATTACHMENT A

PHOTOGRAPHS

Photo No. 1

Site Name:
Houston Gas Light Co.

Location:
1515 Commerce St.
Houston, Texas

CERCLIS #:
TXD981918188

Photographer/Witness Mike Mitchell / Chris Carlson C.C.
Date 1/31/91 **Time** 11:30 **Direction** Facing N.
Description ENTEX natural gas distribution facility at SE corner of site.

Photo No. 2

Photographer/Witness Mike Mitchell / Chris Carlson C.C
Date 1/31/91 **Time** 11:31 **Direction** Facing NW
Description Same as above.

Photo No. 3

Site Name:
Houston Gas Light Co.

Location:
1515 Commerce St.
Houston, Texas

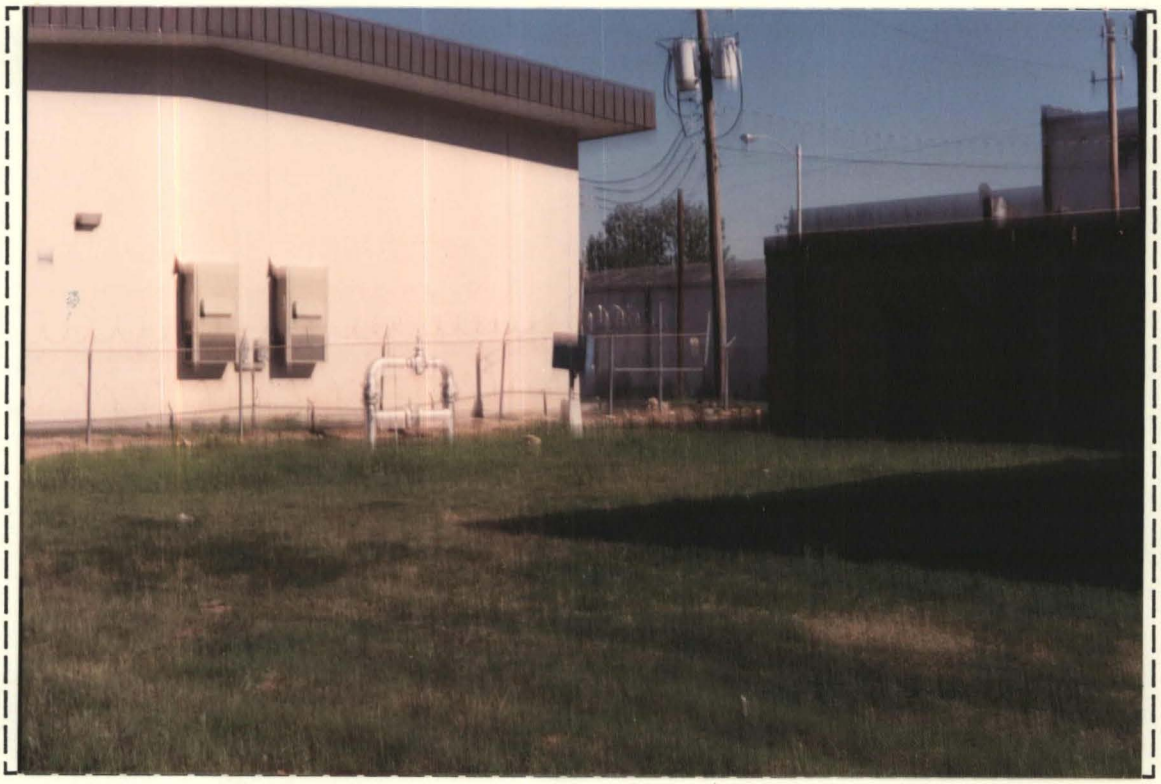
CERCLIS #:
TXD981918188

Photographer/Witness Mike Mitchell / Chris Carlson C.C.
Date 1/31/91 Time 11:32 Direction Facing N.
Description ENTEX natural gas distribution facility.

Photo No. 4

Photographer/Witness Mike Mitchell / Greg Straughn GKS
Date 12/5/90 Time 13:06 Direction Facing N.
Description ENTEX facility, Harris Co. warehouse in background.
Note: natural gas piping.

Photo No. 5



Photographer/Witness Mike Mitchell / Greg Straughn GKS

Date 12/5/90 Time 13:07 Direction Facing NE

Description ENTEX facility.

Site Name:
Houston Gas Light Co.

Location:
1515 Commerce St.
Houston, Texas

CERCLIS #:
TXD981918188

Photo No. 6

Photographer/Witness Mike Mitchell / Greg Straughn GKS

Date 12/5/90 Time 13:08 Direction Facing W.

Description ENTEX facility.

Photo No. 7

Photographer/Witness Mike Mitchell / Greg Straughn GKS

Date 12/5/90 Time 13:22 Direction Facing SW

Description Harris Co. warehouse adjoining Elysian Street Viaduct at the bank of Buffalo Bayou.

Site Name:
Houston Gas Light Co.

Location:
1515 Commerce St.
Houston, Texas

CERCLIS #:
TXD981918188

Photo No. 8

Photographer/Witness Mike Mitchell / Greg Straughn GKS

Date 12/5/90 Time 13:23 Direction Facing NE

Description City of Houston, Sewage pump station at NE corner of site.

Note: Ramp of Elysian Street Viaduct in background.

Photo No.
9

Site Name Houston Gas Light Co.

Location 1515 Commerce St. Houston, Texas

CERCLIS # TXD981918188

Photographer/Witness Mike Mitchell / Greg Straughn

Date 12/5/90 Time 13:32 Direction Facing E

Description Sign on building: "Harris County, Bldg. Supt. Dept., Maintenance & Construction Division"